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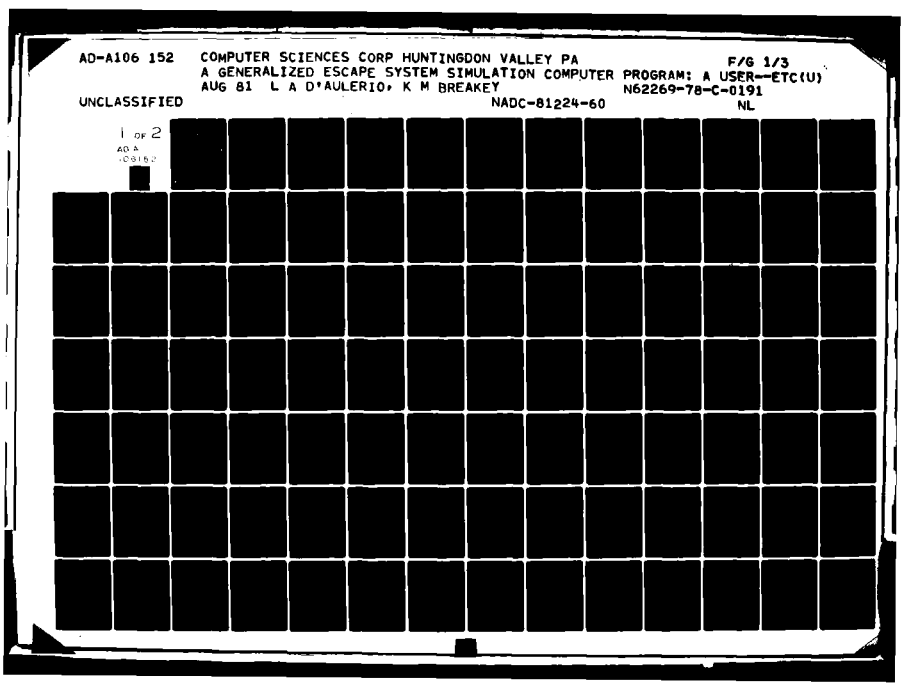

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A GENERALIZED ESCAPE SYSTEM SIMULATION COMPUTER PROGRAM:

A USER'S MANUAL

Louis A. D'Aulerio
Aircraft and Crew Systems Technology Directorate
NAVAL AIR DEVELOPMENT CENTER
Warminster, Pennsylvania 18974

Kathleen M. Breakey, Shirley V. Trimble and Bruce Waldron
COMPUTER SCIENCE CORPORATION
101 Masons Mill Business Park
Huntington Valley, PA 19006

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The Generalized Escape System Simulation Computer Program was developed to simulate the operation of various ejection seats. The program generates a 3-Dimensional trajectory of the ejection seat and its occupant, and is intended to be used in the evaluation of ejection seat design and performance. The program is written in Fortran IV and is highly structured for ease of modification and updating. This report outlines the steps necessary to successfully execute the program.

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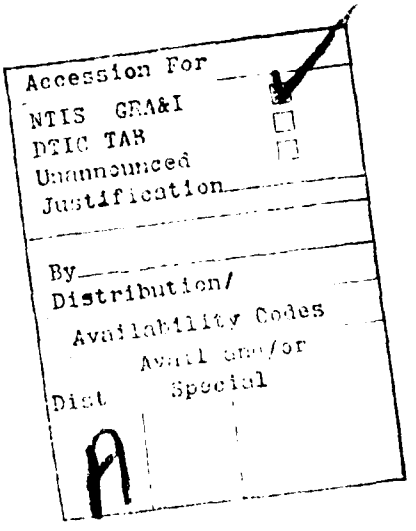
Louis A. D'Aulerio
Aircraft and Crew Systems Technology Directorate
Naval Air Development Center
Warminster, PA 18974

Kathleen M. Breakey, Shirley V. Trimble and Bruce Waldron
Computer Sciences Corporation
101 Masons Mill Business Park
Huntingdon Valley, PA 19006

FOREWORD

This final report presents an outline of the steps required to successfully execute the Generalized Escape System Simulation Computer Program. The program was developed to allow the simulation and analysis of numerous ejection seats under various ejection conditions. A complete listing of the program source code is not included in this report because such a listing would be several hundred pages long. However, a printout and a copy of the program may be obtained by contacting the author at NADC.

A portion of the work contained in this report was performed by Computer Sciences Corporation in accordance with Task Order 46, "Escape System Ejection Seat Simulation and Analysis", issued under contract N62269-78-C-0191.



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I. INTRODUCTION

This manual is a guide to running the Generalized Escape System Simulation (GESS) Program. The following is a list of the segments needed to complete a successful run of this program. These segments must be exercised in the order listed below:

1. Creating the Aerodynamic Coefficient Tables (via the ACT Program).
2. Build a GESS Input File
3. Execute the GESS Program
4. Run Utilities on the Plotting File (Optional)
5. Re-run the GESS Program (Optional)

Each section of this manual describes one of the above segments. Any steps to be performed within each segment must be done in the order in which they are described within the corresponding section.

It will be assumed in this User's Manual that the reader/user is familiar with the NADC Central Computer System and the KRONOS Operating System. If particular questions arise refer to references 1 and 2.

The GESS Program System was written to simulate ejection seat escape systems. The program generates various trajectories of escape system components and personnel by means of mathematical modeling. This program was written in a general sense to simulate a number of ejection seat escape systems. The program is a digital simulation designed to run on a Control Data 6600/Cyber Series Computer. The programming language used was Fortran Extended Version 4. The program requires

an input data file and random files of Aerodynamic Data (see Appendix D). Output reports and plotting files are generated by the GESS Program.

Several naming conventions were used to identify variables and how they were used in the program. Refer to Appendix A for a specific variable description. These naming schedules are listed below:

SA - Variables with this suffix can relate to "Seat Alone" activities.

OA - Variables with this suffix can relate to "Occupant Alone" activities.

SO - Variables with this suffix can relate to "Seat Occupant" activities.

NPTS - Variables containing this can contain a "Number of Points" for indexing etc.

RK - Variables with this prefix can relate to "Rocket" values.

WGHT - Variables containing this can contain a "Weight" value.

X - Variables with this prefix can relate to the "X" axis.

Y - Variables with this prefix can relate to the "Y" axis.

Z - Variables with this prefix can relate to the "Z" axis.

L - Variables with this suffix can relate to a "Left" side.

R - Variables with this suffix can relate to a "Right" side.

VEL - Variables with this can contain a "Velocity" value.

PORO - Variables with this can contain a "Porosity" value.

REC - Variables with this prefix can relate to the "Recovery" chute.

DRO/DR - Variables with either of these prefixes can relate to the "Drogue" chute.

DRT - Variables with this can relate to "Dart" values.

POS - Variables with this can relate to "Position" values.

IGN - Variables with this can relate to "Ignition" values.

CAT - Variables with this can relate to "Catapult" values.

II. A. BUILDING THE GESS PROGRAM INPUT FILE

Prior to running the GESS Program, an eighty column card image input file must be created. This file is divided into start/stop cards, a three line header and fourteen data sections (in this order). Appendix A contains an alphabetical list of the variables by sections. This list gives a brief definition of each input variable, its units of measurement, possible legal values and the input format (in order to determine the magnitude of the number). Appendix C is a sample listing of a typical input file.

The program can be run against several sets of data without having to submit the job several times. To accomplish this, a start card is placed at the beginning of every input set (thus separating the sets). A stop card (or a blank card) is placed at the end (last card) of the entire input file. This card terminates the job.

The three line header is used to identify the input file. It is free formatted and any information can be entered. It must be three lines (or records) long. Blank records may be inserted if necessary.

The input variables are divided into fourteen sections. Sections containing small arrays and/or single variables generally contain one, two, or three fields per record (depending on the layout of the section). The control variables (Section 1) and larger tables of data such as "NPTSCT", for example, have up to four fields per record. A field is 20 columns in length and this length is fixed. The first ten

columns describe the value (usually just the variable name). Information in these ten columns can be entered in free format, however, it is usually left justified for easier reading. Imbedded spaces are used when needed to fill up the ten columns. The entire ten columns can be blank filled since the descriptions are optional. This half of the field is used for entering the actual value. Integer numbers and floating point numbers without a decimal point must be right justified (refer to Appendix A for each variable's input format). Floating point numbers containing the decimal point can be entered anywhere within these ten columns but are usually right justified for easier reading. When possible, these entries are edited for legal values. Descriptive error messages are printed when problems occur. The errors are depicted as either fatal or warnings. Warning messages do not abort the run and default values are substituted for the erroneous values. Fatal errors cause program termination. The input file must be edited manually to correct fatal errors before the job can be re-run.

II. B. DESCRIPTION OF THE GESS INPUT SECTIONS

The rules in the previous paragraphs are general and pertain to all of the fourteen input sections. Each input section also has its own unique set of rules that must be strictly adhered to. All values must be present in the file unless otherwise specified in this section. The following chart (Table 1) describes each of the fourteen input sections. (The start/stop and header records were described earlier but it should be noted that variable 'DOWHAT' contains the value for the start/stop record.

The legal values are 'start', 'stop', or a blank card image, and the data must be left justified). The sections must be in the order in which they appear in Table 1. The sections are broken down into records (each line of variable names represents one record). The order of the records and the order of the variables within the record on the chart is the order in which they are read. Remember, each variable is a twenty column field.

Section	Record (or Line of Input)		Remarks
START/STOP	DOWHAT		
HEADER	-		Enter 3 lines (3, 80 char. records) of information.
1	TSTART, TSTOP, ESTOP, IRESTRT IUNITS, IAIRTR, ISEATTR, ICLRNCE ISOSEP, IPLOT		
2	IREPTS, IREPTS, IREPTS ⋮ IREPTS, IREPTS, IREPTS IPRTFRQ		Thirty (30) word array (IREPTS)
3	DTPHAS1,DTPHAS2,DTPHAS3		
4	TEMP, PRESSUR, VROC XPOS, YPOS, ZPOS YAW, PITCH, ROLL RVEL, QVEL, PVEL WINDX, WINDY, WINDZ VELTOTC, CKPITHT, DENSITY NPTSAAT		
	AAT, AAT, AAT, AAT ⋮ AAT, AAT, AAT, AAT	4a.	4a. Array AAT (4X50). If NPTSAAT=0, AAT is not input. If NPTSAAT is positive (and non-zero) then NPTSAAT is used for the number of 4 item occurrences.
	NPTSLAT LAT, LAT, LAT, LAT ⋮ LAT, LAT, LAT, LAT	4b.	4b. Array LAT (4X50). If NPTSLAT=0, LAT is not input. If NPTSLAT is positive (and non-zero) then NPTSLAT is used for the number of 4 item occurrences.

TABLE 1 A LAYOUT OF THE GESS INPUT BY SECTION (Page 1 of 5)

Section	Record (or Line of Input)	Remarks
5	XPOSSRP, YPOSSRP, ZPOSSRP XCGSA, YCGSA, ZCGSA IXXSA, IXYSA, IXZSA IYYSA, IYZSA, IZZSA PHISA, PSISA, THESA AREASA, HGHTSA, WHGTSA XPOSBOT, YPOSBOT, ZPOSBOT XPOSSCS, YPOSSCS, ZPOSSCS	
6	XCGSO, YCGSO, ZCGSO IXXSO, IXYSO, IXZSO IYYSO, IYZSO, IZZSO AREASO, WGHTSO IXXOA, IXYOA, IXZOA IYYOA, IYZOA, IZZOA AREAOA, WGHTOAB, WHGTOAA	
7	RAILNTH, RAILANG ISTRL, NSLBKS KXSB, KYSB, MUSB XPOSRRE, YPOSRRE, ZPOSRRE XPOSLRE, YPOSLRE, ZPOSLRE XPOSSB, YPOSSB, ZPOSSB ⋮ XPOSSB, YPOSSB, ZPOSSB (7a.)	7a. If NSLBKS=0 then not input else NSLBKS=number of records (or 3-item entries)
8	TO BE ADDED	

TABLE 1 A LAYOUT OF THE GESS INPUT BY SECTION (Page 2 of 5)

Section	Record (or Line of Input)		Remarks	
9	INCAT			
	CATINT, CATSTK, TCI	9a.	9a.	If INCAT=0 then remainder of Section 9 is not input
	XPOSAP, YPOSAP, ZPOSAP			
	NPTSCT		9b.	Repeated N times where N=INCAT
	CATHRST, CATHRST, CATHRST, CATHRST	9b.		
	⋮	9c.	9c.	If NPTSCT=0 then array CATHRST is not input else NPTSCT = # of 2 item pairs See Note
	CATHRST, CATHRST			
	ITUBEND		9d.	If ITUBEND >2 then these records are input
	KTUBE, CTUBE, PTUBE	9d.		
	MUTUBE, RSTCOEF			
10	INRKT		10a.	If INRKT=0 then remainder of section is not input else this group of records repeated N times where N=INRKT
	RKFLAG, RKNPTS	10a.		
	RKIGN, RKWGHT, RKBURN			
	XPOSRK, YPOSRK, ZPOSRK		10b.	If RKNPTS=0 then array RKTHRST is not input else RKNPTS = # of 2 item pairs See Note
	RKALPH, RKBETA, RKGAMA			
	RKTHRST, RKTHRST, RKTHRST, RKTHRST	10b.		
	⋮			
	RKTHRST, RKTHRST			
11	IDART		11a.	If IDART = 0 then the remainder of Section 11 is not input
	DRIFRCE, DRTSTRT, DRTSTOP	11a.		
	XDRTAP, YDRTAP, ZDRTAP			
	XDRTCP, YDRTCP, ZDRTCP			
	XDRTAP, YDRTAP, ZDRTAP			
	XDRTCP, YDRTCP, ZDRTCP			

Section	Record (or Line of Input)		Remarks
12	ITVC		12a. If ITVC = 0 then the remainder of Section 12 is not input
	MPHI, MPSI, MTHE ROLLRL, PITCHRL, SMPLRAT TVCDLAY, RKANG	} 12a.	
13	IDYNCG		13a. If IDYNCG = 0 or 1 then the remainder of Section 13 is not input
	CX, XSLACK, SXP SXN, CY, SY CZ, ZSLACK, SZP ZBOT, SZN1, SZN2	} 13a.	
14	IRECOV		14a. If IRECOV=0 then this group of records is not input
	TRDPLOY, RECOVLL, RECDRAG RECOVPD, POROSR XRECAP, YRECAP, ZRECAP CHALT1, CHALT2, GLIMIT TDELAY		
	NPTSRLS		14b. If NPTSRLS=0 then array RECOVLS is not input else NPTSRLS = # of 2 item pairs See Note
	RECOVLS, RECOVLS, RECOVLS, RECOVLS ⋮ RECOVLS, RECOVLS	} 14b.	
	NPTSRFT		14c. If NPTSRFT=0 then array RECOVFT is not input else NPTSRFT = # of 2 item pairs See Note
	RECOVFT, RECOVFT, RECOVFT, RECOVFT ⋮ RECOVFT, RECOVFT	} 14c.	
	SEPFRCE	} 14a.	

TABLE 1 A LAYOUT OF THE GESS INPUT BY SECTION (Page 4 of 5)

Section	Record (or Line of Input)			Remarks
	IDROGUE			
	DRDRAG2, DROGPD2, POROSD2			14d. If IDROGUE=0 then the remainder of Section 14 is not input.
	VELCON			
	IFTDRO2			
	NPTDFT2			
	DROGFT2, DROGFT2, DROGFT2, DROGFT2	14h	14e	14e. If IFTDRO2 = 0 then this group of records is not input.
	⋮			
	DROGFT2, DROGFT2			
	IFTDRO1			14f. If IFTDRO1=0 then this group of records is not input.
	NPTDFT1			
	DROGFT1, DROGFT1, DROGFT1, DROGFT1	14i	14f	14g. If IDROGLS=0 then this group of records is not input.
	⋮			
	DROGFT1, DROGFT1			14h. If NPTSFT2=0 then array DROGFT2 is not input else NPTSFT2 = # of 2 item pairs See Note
	IDROGLS			
	NPTSDLS			
	DROGLS, DROGLS, DROGLS, DROGLS	14j	14g	14i. If NPTSFT1=0 then array DROGFT1 is not input else NPTSFT2 = # of 2 item pairs See Note
	⋮			
	DROGLS, DROGLS			
	TDDPLOY, DISPLOY, DROGLL			14j. If NPTSDLS= 0 then array DROGLS is not input else NPTSDLS = # of 2 item pairs See Note
	DRDRAG1, DROGPD1, POROSD1			
	DROVELX, DROVELY, DROVELZ			
	XDROGAP, YDROGAP, ZDROGAP			
	AREADC			
	WGHTDC, CDDC			
START/STOP	DOWHAT			

NOTE: Four (4) data items (or 2, 2 item pairs of data) occur per record in this array. However, in the case of an odd number of 2 item pairs, the last record will contain two (2) data items (or 1, 2 item pair of data).

TABLE 1 A LAYOUT OF THE GESS INPUT BY SECTION (Page 5 of 5)

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III. RUNNING THE GESS PROGRAM

The GESS Program can be executed by submitting a previously prepared submit file that contains all of the Job Control Cards (CDC KRONOS Operating System).

NOTE: It is likely that different permanent file names will be used at times (e.g. when different input files or Aerodynamic Coefficient Table Files are used). Make the proper changes before submitting the job. The permanent file name for the input file should be associated with TAPE1. The permanent file name for the Aerodynamic Coefficient Table should be associated with TAPE2.

Refer to Appendix B for a listing of the submit file.

To run the GESS Program from an interactive terminal execute the following:

```
GET, filename
SUBMIT, filename, EI = Print Site
```

If any fatal input errors occur then make the corrections and re-submit the job.

Note that a special library, MATLIB4, is used. This library contains special math functions that are needed to run the GESS Program. Be sure that this library is present in the submit file.

IV. THE AERODYNAMIC COEFFICIENT TABLES PROGRAM (ACT)

A preliminary step must be taken before running the GESS Program. Program "ACT" must be executed to create the Aerodynamic Coefficient tables used by GESS. This program (ACT) is only run once. The tables created by the ACT program are saved on a Random Access File and can be used indefinately. The only reason for re-running "ACT" would be to change the Aerodynamic Coefficients.

Running the ACT Program can be broken down into three parts. First, the input coefficients must be put into card form and stored on a permanent file (associated with Tape 10). Secondly, the ACT Program must be executed. Third, the Aerodynamic Coefficient Tables, created by the ACT program, are saved on a Random Access File which can be used by the GESS Program. Refer to Appendix D for a detailed description of the ACT Program and details on how to run the job. Refer to Appendix E for a Fortran Listing of the ACT Program.

V. PLOTTING FILE

The GESS Program creates a file of plot information (TAPE40). This file is saved as a Permanent Direct Access File called GESSPLT (which is done within the submit file automatically). There are utility programs available for plotting the data on this file. This plotting exercise is optional and is not part of this manual.

VI. RE-RUN OPTION

This enhancement has not been fully implemented. Currently the IRESTRT variable in Section 1 input (Program Control Variables) must be set to zero (0) to bypass the creation of the restart file (which is not complete).

When this is fully implemented the user will have the option of creating a restart file (IRESTRT = 1) or not (IRESTRT = 0). This will allow a user to restart the GESS program at some particular time period or event based on the previous run, thus eliminating the necessity of starting the run from the very beginning of the sequence.

APPENDIX A

GESS INPUT VARIABLES

(DEFINITIONS, UNITS OF MEASUREMENT, LEGAL VALUES, AND INPUT FORMATS)

INPUT DESCRIPTIONS - SECTION 1 - Program Control Variables

VARIABLE NAME	FORMAT	UNITS	DEFINITION	INITIAL VALUES
DOWHAT	8A10		allows mulitple runs. Each input set must begin with a start card. Only last input set is terminated with a stop card or a blank card.	START, (STOP, o blank card)
ESTOP	I2	N.A.	event at which to stop trajectory 0 stop at time TSTOP 1 catapult ignition - catapult 1 2 catapult ignition - catapult 2 3 catapult separation - catapult 1 4 catapult separation - catapult 2 5 rail separation 6 rocket ignition (rkt 1) 7 rocket ignition (rkt 2) 8 rocket ignition (rkt 3) 9 rocket ignition (rkt 4) 10 rocket ignition (rkt 5) 11 rocket ignition (rkt 6) 12 rocket burnout (rkt 1) 13 rocket burnout (rkt 2) 14 rocket burnout (rkt 3) 15 rocket burnout (rkt 4) 16 rocket burnout (rkt 5) 17 rocket burnout (rkt 6) 18 parachute deployment (chute 1) 19 line stretch (chute 1) 20 full inflation (chute 1) 21 parachute deployment (chute 2) 22 line stretch (chute 2) 23 full inflation (chute 2) 24 parachute deployment (chute 3) 25 line stretch (chute 3) 26 full inflation (chute 3) 27 peak trajectory 28 seat/occupant separation 29 seat/occupant impact 30 occupant impact 31 seat impact 32 aircraft impact 33 dart start line 1 (right) 34 dart start line 2 (left) 35 dart line broken - line 1 (right) 36 dart line broken - line 2 (left)	0 - 36
IAIRTR	I1	N.A.	aircraft trajectory control flag 0 =>do not generate aircraft trajectory 1 => generate aircraft trajectory	0,1

INPUT DESCRIPTIONS - SECTION 1 - Program Control Variables - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUE
ICLRNCE	I1	N.A.	clearance computation control flag 0 =>do not compute aircraft/seat - occupant clearance 1 => compute aircraft/seat - occupant clearance	0,1
IPLOT	I3	N.A.	plotting file control flag 0 =>do not create plotting file 1 => create plotting file	0,1
ISEATTR	I1	N.A.	seat alone trajectory control flag 0 =>do not generate seat alone trajectory 1 => generate seat alone trajectory	0,1
ISOSEP	I3	N.A.	seat/occupant separation control flag 0 =>do not allow seat/occupant separation 1 => allow seat/occupant separation	0,1
IRESTRT	I1	N.A.	flag for creation of instantaneous restart file 0 = don't create restart file 1 = create restart file	0,1
IUNITS	I1	N.A.	flag for units to be used 0 = Metric units 1 = English units	0,1
TSTART	F10.4	secs	time to start trajectory simulation (if ≠ 0, start from restart file)	≥ 0
TSTOP	F10.4	secs	time to stop trajectory (if = 0, stop at event ESTOP)	≥0

INPUT DESCRIPTIONS - SECTION 2 - Report Flags

VARIABLE NAMES	FORMAT	UNITS	DESCRIPTION	LEGAL VALUES
IREPTS1	I1	NA	control flag for input validation 0 =>don't print report 1 =>print report	0,1
IREPTS2	I1	NA	control flag for seat/occupant linear time history 0 =>don't print report 1 =>print report	0,1
IREPTS3	I1	NA	control flag for seat/occupant alone linear time history 0 =>don't print report 1 =>print report	0,1
IREPTS4	I1	NA	control flag for occupant alone linear time history 0 =>don't print report 1 =>print report	0,1
IREPTS5	I1	NA	control flag for seat alone linear time history 0 =>don't print report 1 =>print report	0,1
IREPTS6	I1	NA	control flag for seat alone angular time history 0 =>don't print report 1 =>print report	0,1
IREPTS7	I1	NA	control flag for seat/occupant linear time history wrt aircraft 0 =>don't print report 1 =>print report	0,1
IREPTS8	I1	NA	control flag for seat/occupant angular time history wrt aircraft 0 =>don't print report 1 =>print report	0,1
IREPTS9	I1	NA	control flag for occupant alone linear time history wrt aircraft 0 =>don't print report 1 =>print report	0,1
IREPTS10	I1	NA	control flag for seat alone linear time history wrt aircraft 0 =>don't print report 1 =>print report	0,1

INPUT DESCRIPTIONS - SECTION 2 - Report Flags Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	TYPICAL VALUE
IREPTS11	I1	NA	control flag for seat alone angular time history wrt aircraft 0 =>don't print report 1 =>print report	0,1
IREPTS12	I1	NA	control flag for catapult forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS13	I1	NA	control flag for rocket 1 forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS14	I1	NA	control flag for rocket 2 forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS15	I1	NA	control flag for rocket 3 forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS16	I1	NA	control flag for rocket 4 forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS17	I1	NA	control flag for rocket 5 forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS18	I1	NA	control flag for rocket 6 forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS19	I1	NA	control flag for dart forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS20	I1	NA	control flag for drogue forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS21	I1	NA	control flag for parachute forces, moments 0 =>don't print report 1 =>print report	0,1
IREPTS22	I1	NA	control flag for TVC microprocessor data 0 =>don't print report 1 =>print report	0,1

INPUT DESCRIPTIONS - SECTION 2 - Report Flags - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
IREPTS23	I1	NA		0,1
IREPTS24	I1	NA		0,1
IREPTS25	I1	NA		0,1
IREPTS26	I1	NA		0,1
IREPTS27	I1	NA		0,1
IREPTS28	I1	NA		0,1
IREPTS29	I1	NA		0,1
IREPTS30	I1	NA		0,1
PRTFRQ	I3		Controls printing (e.g. if PRTFRQ = 3 and TIMESTEP = .01 the printing occurs every .03 or every 3rd TIMESTEP) if PRTFRQ = 0 then printing occurs every 10th of a second.	0,1,2,.....

INPUT DESCRIPTIONS - SECTION 3 - Integration Time Steps

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
DTPHAS1	F10.4		Integration time step for PHASE 1 (from initiation to rail clearance)	>0
DTPHAS2	F10.4		Integration time step for PHASE 2 (from rail clearance to seat/occ separation)	>0
DTPHAS3	F10.4		Integration time step for PHASE 3 (from seat/occ separation to completion)	>0 if ISOSE anything i ISOSEP = 0

INPUT DESCRIPTIONS - SECTION 4 Aircraft

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
CKPITHT	F10.4	ft.met	height of cockpit screen (protected height of seat/occupant)	
DENSITY	F10.4	slugs/feet^3	Atmospheric Density	
NPTSAAT	I3		number of points in angular acceleration table	0-50
(AAT)	F10.4	time, $\frac{deg}{sec^2}$	angular acceleration table (time vs. deg/sec^2)	
NPTSLAT	I3		number of points in linear acceleration table	0-50
(LAT)	F10.4	time $\frac{ft (met)}{sec^2}$	linear acceleration table (time vs. ft (or met)/sec^2)	
PITCH	F10.4	deg	initial pitch (wrt EFCS)	
PRESSUR	F10.4	millibars	pressure	
PVEL	F10.4	deg/sec	initial angular velocity about aircraft x-axis	
QVEL	F10.4	deg/sec	initial angular velocity about aircraft y-axis	
ROLL	F10.4	deg.	initial roll (wrt EFCS)	
RVEL	F10.4	deg/sec	initial angular velocity about aircraft z-axis	
TEMP	F10.4	F/C	temperature	
VELTOTL	F10.4	ft/sec (met/sec)	initial total velocity of aircraft	$\geq 0.$
VROC	F10.4	ft/sec (met/sec)	initial vertical rate of climb	
WINDX	F10.4	ft./sec (met/sec)	wind velocity x direction (EFCS)	
WINDY	F10.4	ft/sec (met/sec)	wind velocity y direction (EFCS)	
WINDZ	F10.4	ft/sec (met/sec)	wind velocity z direction (EFCS)	
XPOS	F10.4	ft. (met)	initial x-position (downrange) in EFCS (=rail att.pt.)	

INPUT DESCRIPTIONS - SECTION 4 - Aircraft - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	DEFAULT VALUES
XTAIL	F10.4	ft. (met.)	x-position of tail in ACS	
YAW	F10.4	deg	initial yaw (wrt EFCS)	
YPOS	F10.4	ft. (met.)	initial y-position (off range) in EFCS (=rail att. pt.)	
YTAIL	F10.4	ft. (met.)	y-position of tail in ACS	
ZPOS	F10.4	ft. (met.)	initial z-position (altitude) in EFCS (=rail att. pt)	
ZTAIL	F10.4	ft. (met.)	z-position of tail in ACS	

INPUT DESCRIPTION - SECTION 5 - Seat Alone - Initial Conditions

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LOGN. VALUES
AREASA	F10.4	ft^2 (met^2)	reference area of seat alone	
HGHTSA	F10.4	ft. (met)	length of seat alone (height)	
IXXSA	F10.4	slug-ft^2 kg-met^2	Moments of inertia of the seat alone	
IXYSA	F10.4	slug-ft^2 kg-met^2		
IXZSA	F10.4	slug-ft^2 kg-met^2		
IYYSA	F10.4	slug-met^2 kg-met^2		
IYXSA	F10.4	slug-met^2 kg-met^2		
IZZSA	F10.4	slug-met^2 kg-met^2		
PHISA	F10.4	deg	rotation about x - axis of aircraft	
PSISA	F10.4	deg	rotation (neg.) about y - axis of aircraft	
THESA	F10.4	deg	rotation about z - axis of aircraft	
WGHTSA	F10.4	lbs (kg)	weight of seat alone	
XCGSA	F10.4	ft. (met)	X position of CG of seat alone in SCS	
XPOSBOT	F10.4	ft. (met)	X position of seat bottom in RCS	
XPOSSCS	F10.4	ft. (met)	X position of origin of Seat C.S. (lower seat reference point in RCS)	
YCGSA	F10.4	ft. (met)	Y position of CG of seat alone in SCS	
YPOSBOT	F10.4	ft. (met)	Y position of seat bottom in RCS	
YPOSSCS	F10.4	ft. (met)	Y position of origin of Seat C.S. (lower seat reference point in RCS)	
YPOSSRP	F10.4	ft. (met)	Y position of seat aerodynamic reference point in SCS	
ZCGSA	F10.4	ft. (met)	Z position of CG of seat alone in SCS	
ZPOSBOT	F10.4	ft. (met)	Z position of seat bottom in RCS	

INPUT DESCRIPTION - SECTION 5 - Seat Alone - Initial Conditions Cont

VARIABLE NAME	FORMAT	UNITS	DEFINITION	INITIAL VALUES
ZPOSSCS	F10.4	ft. (met)	Z position of origin of Seat C.S. (lower seat reference point in RCS)	
ZPOSSRP	F10.4	ft. (met)	Z position of seat aerodynamic reference point in SCS.	

INPUT DESCRIPTIONS - SECTION 6 - Seat/Occupant, Occupant Alone

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LIMIT VALUES
AREAOA	F10.4	$ft^2(met^2)$	reference area if occupant alone	
AREASO	F10.4	$ft^2(met^2)$	reference area of seat/occupant	
IXXOA	F10.4	slug-ft^2 kg met^2	moment of inertia of occupant alone	
IXXSO	F10.4	slug-ft^2 kg met^2	moment of inertia of seat/occupant	
IXYOA	F10.4	slug-ft^2 kg met^2	moment of inertia of occupant alone	
IXYSO	F10.4	slug-ft^2 kg met^2	moment of inertia of seat/occupant	
IXZOA	F10.4	slug-ft^2 kg met^2	moment of inertia of occupant alone	
IXZSO	F10.4	slug-ft^2 kg met^2	moment of inertia of seat/occupant	
IYYOA	F10.4	slug-ft^2 kg met^2	moment of inertia of occupant alone	
IYYSO	F10.4	slug-ft^2 kg met^2	moment of inertia of seat/occupant	
IYZOA	F10.4	slug-ft^2 kg met^2	moment of inertia of occupant alone	
IYZSO	F10.4	slug-ft^2 kg met^2	moment of inertia of seat/occupant	
IZZOA	F10.4	slug-ft^2 kg met^2	moment of inertia of occupant alone	
IZZSO	F10.4	slug-ft^2 kg met^2	moment of inertia of seat/occupant	
WGHTOAA	F10.4	lbs (kg)	weight of occupant alone after seat/occ separ.	> 0
WGHTOAB	F10.4	lbs (kg)	weight of occupant alone before seat/occ separ.	> 0
WGHTSO	F10.4	lbs (kg)	weight of seat/occupant	> 0
XCGOA	F10.4	ft(met)	X-position of occupant alone C.G. (SCS)	
XCGSO	F10.4	ft(met)	X-position of seat/occupant C.G. (SCS)	
YCGOA	F10.4	ft(met)	Y-position of occupant alone C.G. (SCS)	

INPUT DESCRIPTIONS - SECTION 6 - Seat/Occupant, Occupant Alone - Contin

VARIABLE NAME	FORMAT	UNITS	DEFINITION	INITIAL VALUES
YCGSO	F10.4	ft(met)	Y-position of seat/occupant C.G. (SCS)	
ZCGOA	F10.4	ft(met)	Z-position of occupant alone C.G. (SCS)	
ZCGSO	F10.4	ft(met)	Z-position of seat/occupant C.G. (SCS)	

INPUT DESCRIPTIONS - SECTION 7 - Rail Data

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
ISTRL	I3	N.A.	flag to indicate whether slider blocks are on seat or on rails 0 = on seat 1 = on rails	0, 1 F
KXSB	F10.6	lbs/ft (nt/met)	X - direction spring constant	
KYSB	F10.6	lbs/ft (nt/met)	Y - direction spring constant	
MUSB	F10.6	N.A.	coefficient of friction	
NSLBKS	I3	N.A.	number of slider blocks (NOTE: 0 = 'continuous' slider block)	0-6 F
RAILANG	F10.4	deg	orientation of rails wrt ACS	
RAILNTH	F10.4	ft (met)	length of rails	
XKTOR			* To Be Added Later	
XPOSLRE	F10.4	ft (met)	X - position of left rail attachment point in ACS	
XPOSRRE	F10.4	ft (met)	X - position of right rail attachment point in ACS	
XPOSSB1	F10.4	ft (met)	X - position of slider block 1 SCS	
XPOSSB2	F10.4	ft (met)	X - position of slider block 2 SCS	
XPOSSB3	F10.4	ft (met)	X - position of slider block 3 SCS	
XPOSSB4	F10.4	ft (met)	X - position of slider block 4 SCS	
XPOSSB5	F10.4	ft (met)	X - position of slider block 5 SCS	
XPOSSB6	F10.4	ft (met)	X - position of slider block 6 SCS	
YPOSLRE	F10.4	ft (met)	Y - position of left rail attachment point in ACS	
YPOSRRE	F10.4	ft (met)	Y - position of right rail attachment point in ACS	
YPOSSB1	F10.4	ft (met)	Y - position of slider block 1 SCS	
YPOSSB2	F10.4	ft (met)	Y - position of slider block 2 SCS	
YPOSSB3	F10.4	ft (met)	Y - position of slider block 3 SCS	
YPOSSB4	F10.4	ft (met)	Y - position of slider block 4 SCS	

INPUT DESCRIPTIONS - Section 7 - Rail Data -Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
YPOSSB5	F10.4	ft (met)	Y - position of slider block 5 SCS	
YPOSSB6	F10.4	ft (met)	Y - position of slider block 6 SCS	
ZPOSLRE	F10.4	ft (met)	Z - position of left rail attachment point in ACS	
ZPOSRRE	F10.4	ft (met)	Z - position of right rail attachment point in ACS	
ZPOSSB1	F10.4	ft (met)	Z - position of slider block 1 SCS	
ZPOSSB2	F10.4	ft (met)	Z - position of slider block 2 SCS	
ZPOSSB3	F10.4	ft (met)	Z - position of slider block 3 SCS	
ZPOSSB4	F10.4	ft (met)	Z - position of slider block 4 SCS	
ZPOSSB5	F10.4	ft (met)	Z - position of slider block 5 SCS	
ZPOSSB6	F10.4	ft (met)	Z - position of slider block 6 SCS	

INPUT DESCRIPTIONS - SECTION 8 - Canopy Data

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
ICANOPY	I3	N.A.	Flag to indicate whether or not to track canopy 0 = do not track canopy 1 = track canopy	0, 1

NOTE: Canopy trajectory simulation will be implemented at a later date.

INPUT DESCRIPTIONS - SECTION 9 - Catapult Data

VARIABLE NAME	FORMAT	UNITS	DEFINITION	MAX. VALUES
CATLNT1	F10.4	ft (met)	length of catapult 1 tube	
CATLNT2	F10.4	ft (met)	length of catapult 2 tube	
CATSTK1	F10.4	ft (met)	length of catapult stroke 1	
CATSTK2	F10.4	ft (met)	length of catapult stroke 2	
CTUBE	F10.4	lb sec/ft nt sec/met	C tube spring damping coeff.	
INCAT	I3	N.A.	number of catapults	0 - 2
ITUBEND	I3	N.A.	flag to indicate whether or not to simulate tube bending 0 = no tube bending 1 = do tube bending using default values 2 = do tube bending using input values	0, 1, 2
KTUBE	F10.4	lbs/ft nts/met	K tube spring stiffness constant	
MUTUBE	F10.4	N.A.	coefficient of friction	
NPTSCT1	I3	N.A.	number of points in catapult thrust table (cat. 1)	0 - 25
(thurst table 1)	F10.4	time vs thrust	catapult thrust table - catapult 1	
NPTSCT2	I3	N.A.	number of points in catapult thrust table (cat.2)	0 - 25
(thrust table 2)		time vs thrust	catapult thrust table - catapult 2	
PTUBE	F10.4	N.A.	empirical tube bending constant	
RSTCOEF	F10.4	lb/ft nt/met	restoring force stiffness coeff.	
TCI1	F10.4	sec.	catapult ignition time catapult 1	
TCI2	F10.4	sec.	catapult ignition time catapult 2	
XPOSCAP1	F10.4	ft(met)	X - position of catapult 1 attachment point in SCS	
XPOSCAP2	F10.4	ft(met)	X - position of catapult 2 attachment point in SCS	
YPOSCAP1	F10.4	ft(met)	Y - position of catapult 1 attachment point in SCS	

INPUT DESCRIPTIONS - SECTION 9 - Catapult Data Cont

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUE
YPOSCAP2	F10.4	ft (met)	Y - position of catapult 2 attachment point in SCS	
ZPOSCAP1	F10.4	ft (met)	Z - position of catapult 1 attachment point in SCS	
ZPOSCAP2	F10.4	ft (met)	Z - position of catapult 2 attachment point in SCS	

INPUT DESCRIPTIONS - SECTION 10 - Rocket Data

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
INRKT	F10.4	N.A.	number of rockets on seat	0 - 6
RKALPH1	F10.4	deg		
RKALPH2	F10.4	deg		
RKALPH3	F10.4	deg		
RKALPH4	F10.4	deg		
RKALPH5	F10.4	deg		
RKALPH6	F10.4	deg		
RKBETA1	F10.4	deg	direction cosine angles for rocket 1 wrt SCS	
RKBETA2	F10.4	deg	direction cosine angles for rocket 2 wrt SCS	
RKBETA3	F10.4	deg	direction cosine angles for rocket 3 wrt SCS	
RKBETA4	F10.4	deg	direction cosine angles for rocket 4 wrt SCS	
RKBETA5	F10.4	deg	direction cosine angles for rocket 5 wrt SCS	
RKBETA6	F10.4	deg	direction cosine angles for rocket 6 wrt SCS	
RKBURN1	F10.4	secs	burn time for rocket 1	
RKBURN2	F10.4	secs	burn time for rocket 2	
RKBURN3	F10.4	secs	burn time for rocket 3	
RKBURN4	F10.4	secs	burn time for rocket 4	
RKBURN5	F10.4	secs	burn time for rocket 5	
RKBURN6	F10.4	secs	burn time for rocket 6	
RKFLAG1	I3	N.A.	rocket 1 ignition flag 0 => rocket ignition is a time 1 => rocket ignition is a distance	0, 1
RKFLAG2	I3	N.A.	rocket 2 ignition flag (Ref to RKFLAG1)	0, 1
RKFLAG3	I3	N.A.	rocket 3 ignition flag (Ref to RKFLAG1)	0, 1
RKFLAG4	I3	N.A.	rocket 4 ignition flag (Ref to RKFLAG1)	0, 1
RKFLAG5	I3	N.A.	rocket 5 ignition flag (Ref to RKFLAG1)	0, 1
RKFLAG6	I3	N.A.	rocket 6 ignition flag (Ref to RKFLAG1)	0, 1

INPUT DESCRIPTIONS - SECTION 10 - Rocket Data - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
RKGAMA1	F10.4	deg		
(RKT 1 thrust table		secs vs lbs secs vs nts	thrust table for rocket 1	
RKGAMA2	F10.4	deg		
(RKT 2 thrust table		secs vs lbs secs vs nts	thrust table for rocket 2	
RKGAMA3	F10.4	deg		
(RKT 3 thrust table		secs vs lbs secs vs nts	thrust table for rocket 3	
RKGAMA4	F10.4	deg		
(RKT 4 thrust table		secs vs lbs secs vs nts	thrust table for rocket 4	
RKGAMA5	F10.4	deg		
(RKT 5 thrust table)		secs vs lbs secs vs nts	thrust table for rocket 5	
RKGAMA6	F10.4	deg		
(RKT 6 thrust table)		secs vs lbs secs vs nts	thrust table for rocket 6	
RKIGN1	F10.4	sec ft met	rocket 1 ignition time or distance	
RKIGN2	F10.4	sec ft met	rocket 2 ignition time or distance	
RKIGN3	F10.4	sec ft met	rocket 3 ignition time or distance	
RKIGN4	F10.4	sec ft met	rocket 4 ignition time or distance	
RKIGN5	F10.4	sec ft met	rocket 5 ignition time or distance	
RKIGN6	F10.4	sec ft met	rocket 6 ignition time or distance	
RKNPTS1	I3	N.A.	number of points in thrust table for rocket 1	2 - 25
RKNPTS2	I3	N.A.	number of points in thrust table for rocket 2	2 - 25
RKNPTS3	I3	N.A.	number of points in thrust table for rocket 3	2 - 25

INPUT DESCRIPTIONS - SECTION 10 - Rocket Data - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
RKNPTS4	I3	N.A.	number of points in thrust table for rocket 4	2 - 25
RKNPTS5	I3	N.A.	number of points in thrust table for rocket 5	2 - 25
RKNPTS6	I3	N.A.	number of points in thrust table for rocket 6	2 - 25
RKWGHT1	F10.4	lbs kgs	weight of fuel in rocket 1	
RKWGHT2	F10.4	lbs kgs	weight of fuel in rocket 2	
RKWGHT3	F10.4	lbs kgs	weight of fuel in rocket 3	
RKWGHT4	F10.4	lbs kgs	weight of fuel in rocket 4	
RKWGHT5	F10.4	lbs kgs	weight of fuel in rocket 5	
RKWGHT6	F10.4	lbs kgs	weight of fuel in rocket 6	
XPOSRK1	F10.4	ft met	X - position of rocket 1 in SCS	
XPOSRK2	F10.4	ft met	X - position of rocket 2 in SCS	
XPOSRK3	F10.4	ft met	X - position of rocket 3 in SCS	
XPOSRK4	F10.4	ft met	X - position of rocket 4 in SCS	
XPOSRK5	F10.4	ft met	X - position of rocket 5 in SCS	
XPOSRK6	F10.4	ft met	X - position of rocket 6 in SCS	
YPOSRK1	F10.4	ft met	Y - position of rocket 1 in SCS	
YPOSRK2	F10.4	ft met	Y - position of rocket 2 in SCS	
YPOSRK3	F10.4	ft met	Y - position of rocket 3 in SCS	
YPOSRK4	F10.4	ft met	Y - position of rocket 4 in SCS	
YPOSRK5	F10.4	ft met	Y - position of rocket 5 in SCS	
YPOSRK6	F10.4	ft met	Y - position of rocket 6 in SCS	

INPUT DESCRIPTIONS - SECTION 10 (Cont) Rocket Data

VARIABLE NAME	FORMAT	UNITS	DEFINITION	INITIAL VALUES
ZPOSRK1	F10.4	ft met	Z - position of rocket 1 in SCS	
ZPOSRK2	F10.4	ft met	Z - position of rocket 2 in SCS	
ZPOSRK3	F10.4	ft met	Z - position of rocket 3 in SCS	
ZPOSRK4	F10.4	ft met	Z - position of rocket 4 in SCS	
ZPOSRK5	F10.4	ft met	Z - position of rocket 5 in SCS	
ZPOSRK6	F10.4	ft met	Z - position of rocket 6 in SCS	

INPUT DESCRIPTIONS - SECTION 11 - Dart

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
DRTFRCE	F10.4	lbs nts	DART FORCE	
DRTSTRT	F10.4	ft. met	DART START DISTANCE	
DRTSTOP	F10.4	ft. met	DART STOP DISTANCE	> DART STAR
IDART	I3	N.A.	DARTFLAG: 0 = no dart system 1 = DART system	0, 1
XDRTAPL	F10.4	ft. met	X POSITION OF LEFT DART COCKPIT ATTACHMENT POINT IN SCS	
XDRTAPR	F10.4	ft. met	X POSITION OF RIGHT DART COCKPIT ATTACHMENT POINT IN SCS	
XDRTCPL	F10.4	ft. met	X POSITION OF LEFT DART CONFLUENCE POINT IN SCS	
XDRTCPR	F10.4	ft. met	X POSITION OF RIGHT DART CONFLUENCE POINT IN SCS	
YDRTAPL	F10.4	ft. met	Y POSITION OF LEFT DART COCKPIT ATTACHMENT POINT IN SCS	
YDRTAPR	F10.4	ft. met	Y POSITION OF RIGHT DART COCKPIT ATTACHMENT POINT IN SCS	
YDRTCRL	F10.4	ft. met	Y POSITION OF LEFT DART CONFLUENCE POINT IN SCS	
YDRTCPR	F10.4	ft. met	Y POSITION OF RIGHT DART CONFLUENCE POINT IN SCS	
ZDRTAPL	F10.4	ft. met	Z POSITION OF LEFT DART COCKPIT ATTACHMENT POINT IN SCS	
ZDRTAPR	F10.4	ft. met	Z POSITION OF RIGHT DART COCKPIT ATTACHMENT POINT IN SCS	
ZDRTCPL	F10.4	ft. met	Z POSITION OF LEFT DART CONFLUENCE POINT IN SCS	
ZDRTCPR	F10.4	ft. met	Z POSITION OF RIGHT DART CONFLUENCE POINT IN SCS	

INPUT DESCRIPTIONS - SECTION 12 - TVC Data

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
ITVC	I3	N.A.	flag to control whether or not thrust vector control is to be simulated 0 = do not simulate TVC 1 = simulate TVC	0, 1
MPHI	F10.4	DEG	rotation about x - axis of SCS to get TVCCS	
MPSI	F10.4	DEG	rotation (neg) about y - axis of SCS to get TVCCS	
MTHE	F10.4	DEG	rotation about z - axis of SCS to get TVCCS	
PITCHRL	F10.4	DEG	rocket movement limit in "PITCH" plane	
RKANG	F10.4			
ROLLRL	F10.4	DEG	rocket movement limit in "ROLL" plane	
SMPLRAT	F10.4	DEG/SEC	maximum sampling rate of gyroscopes	
TVCDLAY	F10.4	SECS	time delay after rocket ignition to start gimballing	

INPUT DESCRIPTIONS - SECTION 13 Dynamic CG Variables

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
CX	F10.4	nt/met-sec lb/ft/sec	X DAMPING CONSTANT	
CY	F10.4	nt/met-sec lb/ft/sec	Y DAMPING CONSTANT	
CZ	F10.4	nt/met-sec lb/ft/sec	Z DAMPING CONSTANT	
IDYNCG	I3	N.A.	flag to determine whether or not to simulate dynamic CG movement 0 = do not simulate CG movement 1 = simulate using default data 2 = simulate using input data	0,1,2
SXN	F10.4	nt/ met lb/ft	X SPRING MODULUS CONSTANT	
SXP	F10.4	nt/met lb/ft	X SPRING MODULUS CONSTANT	
SY	F10.4	nt/met lb/ft	Y SPRING MODULUS CONSTANT	
SZN1	F10.4	nt/met lb/ft	Z SPRING MODULUS CONSTANT	
SZN2	F10.4	nt/met lb/ft	Z SPRING MODULUS CONSTANT	
SZP	F10.4	nt/met lb/ft	Z SPRING MODULUS CONSTANT	
XSLACK	F10.4	ft (met)	X DIRECTION DEAD ZONE	
ZBOT	F10.4	ft (met)	Z DIRECTION BOTTOMING DISTANCE	
ZSLACK	F10.4	ft (met)	Z DIRECTION DEAD ZONE	

INPUT DESCRIPTIONS - SECTION 14 - Parachute Variables

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
AREADC	F10.4	FT^2 (MET^2)	REFERENCE AREA OF THE DROGUE CONTAINER/SLUG	≥ 0
CDDC	F10.4	N/A	DROGUE CHUTE CONTAINER/SLUG DRAG COEFFICIENT	≥ 0
CHALT1	F10.4	FT. (MET)	LOWER ALTITUDE PARAMETER USED IN DETERMINING TIME DELAYS FOR CHUTE DEPLOYMENT	≥ 0
CHALT2	F10.4	FT. (MET)	UPPER ALTITUDE PARAMETER USED IN DETERMINING TIME DELAYS FOR CHUTE DEPLOYMENT	≥ 0
DISPLOY	F10.4	FT. (MET)	DISTANCE ALONG THE RAILS THAT THE SEAT/OCCUPANT MUST TRAVEL BEFORE THE DROGUE CHUTE IS DEPLOYED	≥ 0
DRDRAG1	F10.4	N/A	DROGUE CHUTE 1 DRAG COEFFICIENT	≥ 0
DRDRAG2	F10.4	N/A	DROGUE CHUTE 2 DRAG COEFFICIENT	≥ 0
[DROGFT1]	F10.4	FT/SEC (MET/SEC) SEC	TABLE OF TIMES FROM FIRST DROGUE CHUTE LINE STRETCH TO FULL INFLATION (VELOCITY VS. TIME)	
[DROGFT2]	F10.4	FT/SEC (MET/SEC) SEC	TABLE OF TIMES FROM SECOND DROGUE CHUTE LINE STRETCH TO FULL INFLATION (VELOCITY VS. TIME)	
DROGLL	F10.4	FT.(MET)	DROGUE CHUTE LINE LENGTH	> 0
[DROGLS]	F10.4	FT/SEC (MET/SEC) SEC	TABLE OF TIMES FROM SHACKLE RELEASE TO DROGUE CHUTE LINE STRETCH (VELOCITY VS. TIME)	
DROGPD1	F10.4	FT. (MET)	DROGUE CHUTE1 PROJECTED DIAMETER	> 0
DROGPD2	F10.4	FT. (MET)	DROGUE CHUTE2 PROJECTED DIAMETER	> 0
DROVELX	F10.4	FT/SEC (MET/SEC)	X AXIS PROJECTION VELOCITY OF THE DROGUE CONTAINER RELATIVE TO THE SEAT IN THE SCS	ANY VALUE
DROVELY	F10.4	FT/SEC (MET/SEC)	Y AXIS PROJECTION VELOCITY OF THE DROGUE CONTAINER RELATIVE TO THE SEAT IN THE SCS	ANY VALUE
DROVELZ	F10.4	FT/SEC (MET/SEC)	Z AXIS PROJECTION VELOCITY OF THE DROGUE CONTAINER RELATIVE TO THE SEAT IN THE SCS	ANY VALUE
GLIMIT	F10.4	N/A	ACCELERATION ALONG THE SEAT BACK ABOVE WHICH RECOVERY CHUTE DEPLOYMENT IS DELAYED	ANY VALUE

INPUT DESCRIPTIONS - SECTION 14 - Parachute Variables - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUES
IDROGLS	I3	N/A	DROGUE CHUTE TIME-TO-LINE STRETCH CONTROL FLAG 0 = CALCULATED THEORETICAL 1 = TABLE	0,1
IDROGUE	I3	N/A	FLAG TO INDICATE TYPE OF DROGUE SYSTEM 0 = NO DROGUE 1 = NONE OR 1 DROGUE DEPENDING ON ALTITUDE AND VELOCITY (STENCEL) 2 = DUPLEX DROGUE SYSTEM 3 = VELCON DROGUE SYSTEM	0,1,2,3

INPUT DESCRIPTIONS - SECTION 14 - PARACHUTE VARIABLES - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	LEGAL VALUE
IFTDRO1	I3	N/A	FILLING TIME CONTROL FLAGS FOR DROGUES 1 AND 2	0,1
IFTDRO2	I3	N/A	= 0 - CALCULATED THEORETICAL = 1 - TABLES	0,1
IFTRECV	I3	N/A	FILLING TIME CONTROL FLAG FOR RECOVERY CHUTE = 0 - CALCULATED THEORETICAL = 1 - TABLE	
IRECOV	I3	N/A	FLAG TO INDICATE WHETHER OR NOT THERE IS A RECOVERY CHUTE 0 = NO RECOVERY CHUTE 1 = STENCEL 2 = GO TYPE AEROCONICAL CANOPY	0,1
NPTDFT1	I3	N/A	NUMBER OF POINTS IN FIRST DROGUE CHUTE FILLING TIME TABLE	2-25
NPTDFT2	I3	N/A	NUMBER OF POINTS IN SECOND DROGUE CHUTE FILLING TIME TABLE	2-25
NPTSDLS	I3	N/A	NUMBER OF POINTS IN DROGUE CHUTE LINE STRETCH TABLE	2-25
NPTSRFT	I3	N/A	NUMBER OF POINTS IN RECOVERY CHUTE FILLING TIME TABLE	2-25
NPTSRLS	I3	N/A	NUMBER OF POINTS IN RECOVERY CHUTE LINE STRETCH TABLE	2-25
POROSD1	F10.4	N/A	EFFECTIVE POROSITY OF DROGUE CHUTE1	≥ 0
POROSD2	F10.4	N/A	EFFECTIVE POROSITY OF DROGUE CHUTE2	≥ 0
POROSR	F10.4	N/A	EFFECTIVE POROSITY OF RECOVERY CHUTE	≥ 0
RECDRAG	F10.4	N/A	RECOVERY CHUTE DRAG COEFFICIENT	≥ 0
RECOVFT	F10.4		TABLE OF TIMES FROM RECOVERY CHUTE LINE STRETCH TO FULL INFLATION (VELOCITY VS. TIME)	
RECOVLL	F10.4	FT(MET)	RECOVERY CHUTE LINE LENGTH	≥ 0
RECOVLS	F10.4	FT/SEC S MET/SEC E C	TABLE OF TIMES FROM SHACKLE RELEASE TO RECOVERY CHUTE LINE STRETCH (VELOCITY VS. TIME)	
RECOVPD	F10.4	FT (MET)	RECOVERY CHUTE PROJECTED DIAMETER	≥ 0
SEPFRCE	F10.4	LBS NTS	SEPARATION FORCE SEAT/OCCUPANT	

INPUT DESCRIPTIONS - SECTION 14 Parachute Variables - Continued

VARIABLE NAME	FORMAT	UNITS	DEFINITION	INITIAL VALUES
TDOPLOY	F10.4	SEC.	DROGUE DEPLOYMENT TIME	0
TDELAY	F10.4	SEC.	DELAY TIME OF RECOVERY CHUTE DEPLOYMENT	
TDROGLS			* TO BE ADDED LATER	
TFP1			* TO BE ADDED LATER	
TFP2			* TO BE ADDED LATER	
TFP3			* TO BE ADDED LATER	
TRDPLOY	F10.4	SEC.	RECOVERY CHUTE DEPLOYMENT TIME	0
VELCON	F10.4	FT/SEC	RESULTANT VELOCITY AT WHICH LARGE VELCON DROGUE FALLS OFF	0
WGHTDC	F10.4	LBS(KG)	WEIGHT OF THE DROGUE CONTAINER/SLUG	0
XDROGAP	F10.4	FT. (MET)	X - COORDINATE OF THE DROGUE ATTACHMENT POINT (SCS)	ANY VALUE
XRECAP	F10.4		ATTACHMENT POINT OF RECOVERY CHUTE	
YDROGAP	F10.4	FT. (MET)	Y - COORDINATE OF THE DROGUE ATTACHMENT POINT (SCS)	ANY VALUE
YRECAP	F10.4		ATTACHMENT POINT OF RECOVERY CHUTE	
ZDROGAP	F10.4	FT.(MET)	Z - COORDINATE OF THE DROGUE ATTACHMENT POINT (SCS)	ANY VALUE
ZRECAP	F10.4		ATTACHMENT POINT OF RECOVERY CHUTE	

APPENDIX B

LISTING OF THE GESS SUBMIT FILE

```
/JOB
GESS(CB173000,T30)
ACCOUNT(NUMBER,PASSWORD)
RETURN(TAPE1,TAPE2,TAPE3,TAPE4)
RETURN(TAPE5,TAPE6,TAPE7,TAPE8)
RETURN(TAPE9,TAPE10,TAPE11,TAPE12)
RETURN(TAPE13,TAPE14,TAPE15,TAPE16)
RETURN(TAPE17,TAPE18,TAPE19,TAPE20)
RETURN(TAPE21,TAPE22,TAPE23,TAPE24)
RETURN(TAPE25,TAPE26,TAPE27,TAPE28)
RETURN(TAPE29,TAPE30,TAPE31)
RETURN(TAPE32,TAPE33,TAPE34)
RETURN(TAPE35,TAPE36,TAPE37)
RETURN(TAPE38,TAPE39,TAPE40)
PURGE(GESSPLT)
DEFINE(TAPE40=GESSPLT)
GET(TAPE1=GESSIN)
GET(TAPE2=AERO4)
GET(GESBNRY)
GET(MATLIB4/UN=SYSTEM)
LDSET(LIB=MATLIB4,MAP=BS)
GESBNRY.
1,REWIND(TAPE1,TAPE2,TAPE3,TAPE4)
REWIND(TAPE5,TAPE6,TAPE7,TAPE8)
REWIND(TAPE9,TAPE10,TAPE11,TAPE12)
REWIND(TAPE13,TAPE14,TAPE15,TAPE16)
REWIND(TAPE17,TAPE18,TAPE19,TAPE20)
REWIND(TAPE21,TAPE22,TAPE23,TAPE24)
REWIND(TAPE25,TAPE26,TAPE27,TAPE28)
REWIND(TAPE29,TAPE30,TAPE31)
REWIND(TAPE32,TAPE33,TAPE34)
REWIND(TAPE35,TAPE36,TAPE37)
REWIND(TAPE38,TAPE39,TAPE40)
COPYBF(TAPE5)
COPYBF(TAPE6)
COPYBF(TAPE7)
COPYBF(TAPE8)
COPYBF(TAPE9)
COPYBF(TAPE10)
COPYBF(TAPE11)
COPYBF(TAPE12)
COPYBF(TAPE13)
COPYBF(TAPE14)
COPYBF(TAPE15)
COPYBF(TAPE16)
COPYBF(TAPE17)
COPYBF(TAPE18)
COPYBF(TAPE19)
COPYBF(TAPE20)
```

```
COPYBF(TAPE21)
COPYBF(TAPE22)
COPYBF(TAPE23)
COPYBF(TAPE24)
COPYBF(TAPE25)
COPYBF(TAPE26)
COPYBF(TAPE27
COPYBF(TAPE28)
COPYBF(TAPE29)
COPYBF(TAPE30
COPYBF(TAPE31)
COPYBF(TAPE32)
COPYBF(TAPE33)
COPYBF(TAPE34)
COPYBF(TAPE35)
COPYBF(TAPE36)
COPYBF(TAPE37)
COPYBF(TAPE38)
COPYBF(TAPE39)
EXIT.
GOTO,1.
/EOR
/EOI
```

APPENDIX C

SAMPLE INPUT FOR THE GESS PROGRAM

```
START
THIS IS TEST DATA
FOR MPES NON-CATAPULT VERSION, 90 DEG ROLL TEST
THIRD LINE
TSTART          0.0 TSTOP         0.00 ESTOP          12 IRESTRT          0
IUNITS            1 IAIRTR           0 ISEATTR         0 ICLRNCE         0
ISOSEP            0 IPLOT            1
IREPTS(1)         1IREPTS(2)         1IREPTS(3)        1
IREPTS(4)         0IREPTS(5)         1IREPTS(6)        0
IREPTS(7)         0IREPTS(8)         0IREPTS(9)        0
IREPTS(10)        0IREPTS(11)        0IREPTS(12)       1
IREPTS(13)        1IREPTS(14)        0IREPTS(15)       0
IREPTS(16)        0IREPTS(17)        0IREPTS(18)       0
IREPTS(19)        0IREPTS(20)        0IREPTS(21)       0
IREPTS(22)        1IREPTS(23)        1IREPTS(24)       1
IREPTS(25)        0IREPTS(26)        0IREPTS(27)       0
IREPTS(28)        0IREPTS(29)        0IREPTS(30)       0
PRTFRQ           10
DTPHAS1       .00125 DTPHAS2     .00125 DTPHAS3       .01
TEMP            89.0 PRESSUR   925.900 VROC           0.0
XPOS          7300.0 YPOS         -9.5 ZPOS          61.0
YAW              0.0 PITCH         0.0 ROLL         180.0
RVEL             0.0 QVEL          0.0 PVEL           0.0
WINDX            0.0 WINDY        0.00 WINDZ          0.0
VELTOTL         0.00 CKPITHT       4.0 DENSITY        0.0
NPTSAAT             0
NPTSLAT             0
XPOSSRP          0.0 YPOSSRP       0.0 ZPOSSRP        0.0
XCGSA          .4648 YCGSA         0.0 ZCGSA       1.1299
IXXSA            4.0 IXYSA         0.0 IXZSA          0.0
IYYSA            5.0 IYZSA         0.0 IZZSA          1.0
PHISA            0.0 PSISA       -13.0 THESA          0.0
AREASA           6.0 HGHTSA        3.0 WGHTSA       143.0
XPOSBOT          0.0 YPOSBOT       0.0 ZPOSBOT        0.0
XPOSSCS          0.0 YPOSSCS       0.0 ZPOSSCS        0.0
XCGSO         0.8250 YCGSO         0.0 ZCGSO        1.092
IXXSO          10.75 IXYSO         0.0 IXZSO         3.46
IYYSO          15.19 IYZSO         0.0 IZZSO         6.82
AREASO           7.5 WGHTSO      359.0
 IXXOA           0.0 IXYOA         0.0 IXZOA          0.0
 IYYOA           0.0 IYZOA         0.0 IZZOA          0.0
AREAOAA          9.6 WGHTOAB     216.0 WGHTOAA      216.0
RAILNTH         3.66 RAILANG     -13.0
ISTRL               0 NSLBKS          0
KXSB         35000.0 KYSB      20000.0 MUSB        0.025
XKTOR       261.7801
XPOSRRE          0.0 YPOSRRE       0.0 ZPOSRRE        0.0
XPOSLRE          0.0 YPOSLRE       0.0 ZPOSLRE        0.0
INCAT              1
CATLNT(1)        3.60 CATSTK(1)    3.60 TCI(1)         0.0
XPOSAP(1)        0.00 YPOSAP(1)    0.00 ZPOSAP(1)     -3.59
```

NPTSCT(1)	2				
	0.0		0.0	0.3	0.0
ITUBEND	0				
INRKT	1				
RKFLAG(1)	0	RKNPTS(1)	20		
RKIGN(1)	0.0	RKWGHT(1)	6.0	RKBURN(1)	1.750
XPOSRK(1)	.8553	YPOSRK(1)	0.0	ZPOSRK(1)	0.0
RKALPH(1)	90.000	RKBETA(1)	90.00	RKGAMA(1)	0.000
	0.0		0.0	0.0921	787.9528
	0.1842		1065.9542	0.2763	1410.8922
	0.3684		1761.9124	0.4605	2693.0230
	0.5526		2693.0230	0.6447	3133.0848
	0.7368		3474.7570	0.8289	3793.9460
	0.9211		3938.1702	1.0132	3871.6354
	1.1053		3495.4746	1.1974	2955.9940
	1.2895		2219.5930	1.3816	1268.8412
	1.4737		573.4004	1.5658	218.1590
	1.6579		34.0892	1.7500	0.0000
IDART	0				
ITVC	1				
MPHI	180.0000	MPSI	13.0	MTHE	0.000
ROLLRL	16.000	PITCHRL	16.00	SMPLRAT	500.00
TVCDLAY	.400	RKANG	0.0		
IDYNCG	0				
IRECOV	0				
IDROGUE	0				
STOP					

APPENDIX D

DETAILED DESCRIPTION OF THE ACT PROGRAM

ABSTRACT

This appendix describes a Fortran extended program designed to create random files of equally spaced aerodynamic coefficient tables. These tables, which may represent functions of two or three variables, are to be used as input data for a seat ejection program (GESS).

These coefficients are used in the computation of the equations which calculate the aerodynamic forces and moments acting on a body.

This appendix was derived almost entirely from Reference 5. It is included here since it is crucial for the successful execution of the GESS Program.

I. INTRODUCTION

During execution of the GESS seat ejection simulation program, equally spaced aerodynamic coefficients are required to compute the aerodynamic forces acting upon the seat/occupant system. These data have been obtained through wind tunnel experiments using various ejection seats. Using the data that were produced by these tests, the aerodynamic coefficient table (ACT) program creates tables that are a function of the seat orientation and its velocity. See Reference 6 for details on the wind tunnel experiments.

The ACT program provides an efficient method of creating and modifying these aerodynamic coefficient tables. The tables are then stored on a random access file so that they can be easily retrieved by the GESS program during execution of simulation runs.

Because of their similarity, this program was closely modeled after the "RFWTHR" Program (see Reference 3).

II. DESCRIPTION

A. Aerodynamic Coefficient Tables

The ACT program creates Aerodynamic Coefficient Tables that are designed to be functions of either two or three variables. The format in which the ACT tables are created is designed to be similar to the format in which the experimental data are received. A maximum of 500 entries is allowed in a table. For three-way tables, the coefficients are functions of the angle of attack (alpha), the angle of sideslip (beta), and mach number (mach). The two-way tables may be functions of beta and mach, beta and alpha, or alpha and mach.

By specifying the order in which the data must be read into memory, and through the use of variable dimensioned arrays, the user can easily store and reference his tables on random files. As the coefficients are stored in consecutive locations in memory, it is necessary that the data be read in as follows:

For three-way data:

```
C(I,J,K) = F(ALPHA(I),BETA(J),MACH(K)), I = 1,L
                                        J = 1,M
                                        K = 1,N
```

For two-way data:

```
C(J,K) = F(BETA(J),MACH(K)), J = 1,M
                             K = 1,N
```

or

```
C(J,I) = F(BETA(J),ALPHA(I)), J = 1,M
                              I = 1,L
```

or C(I,K) = F(ALPHA(I),MACH(K)), I = 1,L

K = 1,N

Where L, M, and N are the number of alpha, beta, and mach coordinates, respectively. Properly dimension , the array name at (L,M,N), facilitates printout of the tables.

B. Sequence Numbers

A sequence number is assigned to each table and used to reference the disk address at which the table is stored. During creation runs, the program assigns consecutive numbers to the tables as they are read. It was arbitrarily decided that the three-way tables would be assigned sequence numbers 1 to 20, and two-way tables would be assigned numbers 21 to 50. See reference 5 for further information on random files and sequence numbers.

When the tables are extended, the program searches the appropriate "info" array (see Section II.D.2) to determine the sequence number of the last table on random file. The tables that are added are assigned sequence numbers beginning with the next available sequence number. During this search, a check is made to be sure that the tables will not be extended beyond their limit.

To replace a table, the user must specify on card type 3, the sequence number of the table he wishes replaced.

C. "Info" Array

Associated with each table is an "info" array, containing information about each table. There is a 20 by 13 array, INFO3, associated with the three-way tables, and a 30 by 10 array, INFO2, for the two-way tables. These arrays are updated and written to a random file after creating, extending, or replacing tables. To facilitate referencing, the 20 by 13 "info" array is assigned disk address 51, and the 30 by 10 "info" array is assigned address 52.

During an extension run, the proper "info" array is interrogated to determine the number of tables already on random file. The new tables are assigned the next available sequence number, provided there is room to extend them.

In the replacement mode, the first work in the "info" array for the given sequence number is checked to be sure that a table with that sequence number already exists.

The contents of the "info" array, with J representing the sequence number of the current table being processed, are as shown below.

For two-way tables:

INFO2(J,1) = Table Identifier

INFO2(J,2) = Number of Betas

INFO2(J,3) = Number of Machs

INFO2(J,4) = Delta Beta

INFO2(J,5) = Delta Mach

INFO2(J,6) = Minimum Beta

INFO2(J,7) = Minimum Mach

INFO2(J,8) = Maximum Beta

INFO2(J,9) = Maximum Mach

INFO2(J,10)= Type of Two-way Table

Note: Depending on the type of two-way table being processed, the word "Beta" or "Mach", as used above, may be replaced by "Alpha".

For three-way tables:

INFO3(J,1) = Table Identifier

INFO3(J,2) = Number of Alphas

INFO3(J,3) = Number of Betas

INFO3(J,4) = Number of Machs

INFO3(J,5) = Delta Alpha

INFO3(J,6) = Delta Beta

INFO3(J,7) = Delta Mach

INFO3(J,8) = Minimum Alpha

INFO3(J,9) = Minimum Beta

INFO3(J,10)= Minimum Mach

INFO3(J,11)= Maximum Alpha

INFO3(J,12)= Maximum Beta

INFO3(J,13)= Maximum Mach

D. Common Variables

1. Defined Externally

The following common variables are defined by the user through the input.

ALMAX	BEMIN	DELMAC	ITYPE	MODE	NTYP
ALMIN	DELALP	FMT	MAMAX	NCOEF	
BEMAX	DELBET	IDENT	MAMIN	NOFTAB	

The mnemonic definitions of the above will be found in Section III.C.1.

2. Defined Internally

The following table gives the definitions for the common variables which are initialized by the program.

MNEMONIC	DESCRIPTION
IBLNK	Hollerith word for blanking out the table name in the "info" array.
IC	The sequence number of the current table. Used in the ACT and INPUTT routines when referencing the "info' array.
IERTEST	Internal test work, set by the ERMSG subroutine, which will alter the flow of the program to compensate for an input error. = 1 Ignore present case, read next type 1 card. = 2 Read excess tables into a dummy name. = 3 Disregard present table, read next table. = 4 End program after present case.
IJ, IK	In a list of extend run, they return the number of tables that have been written to the "info" array.
INFO2, IF2 INFO3, IF3	Two dimensional array which is equivalenced to the three dimensional array INFO3. The array INFO2 (30,10) contains the "info" array for two-way tables. INFO3 (20,13) contains

	the "info" array for the tables of three-way data. Detailed information concerning the contents of the "info" array may be found in Section II.C.
ISEQNO	The sequence number of the table to be replaced. (See Section III.C.1)
ITABNO	Position of table "ISEQNO" on the info array. = ISEQNO - 20 for two-way tables. = ISEQNO for three-way tables.
I2NO I3NO	The number of two-way and three-way tables, respectively. Used as a counter when printing the file dictionary.
MTEST	A control word used in the PTOUT and WRINFO routines. = 0 Read the "info" array from random file prior to processing the first table on a replace or an extension run. = 1 Do not read the "info" array again. = 9 The PTOUT routine only prints the file dictionary.
NAL NBE NMA	The number of alpha, beta, and mach numbers, respectively, that are contained in the present table. Computed by the program from the given maximum, minimum, and delta values for each variable.

E. System Routines

The following routines, which are called by the ACT program, are available on the CDC system's library:

NAME	DESCRIPTION
OPENMS	Informs the operating system that the mass storage file will be a random access file.

READMS	Transfers data from mass storage to central memory.
SECOND	Gives accumulated central processor time.
WRITMS	Transfers data from central memory to mass storage.

A more complete description of these routines can be found in Reference 4.

III. INPUT GUIDE

A. I/O Requirements

The input/output requirements of this program require that the following buffer areas be reserved.

FILE NAME	DEFAULT	CONTENTS	FORMAT
TAPE10/INPUT	Permanent File/ Card Reader	Card Images	Coded
OUTPUT	Printer	Program Output	Coded
TAPE1	Local	Aerodynamic Tables	Random, Binary

It should be recognized that TAPE1 is a random file, which may be saved as a permanent file according to the procedures explained in Reference 1.

B. Deck Setup

The object code for this program is saved as a permanent file. The program may be referenced under the filename ACTBIN. Loading of the program requires 50K octal locations of core.

1. Job Control for creation run.

The following control cards (starting in column 1) are required to execute ACT and save the tables that are created and stored on the random file.

CASE1. If input data is from cards

```
JOBNAME,CB50000,T10.
ACCOUNT,NUMBER,PASSWORD.
GET,LGO=ACTBIN.                    BINARY OF ACT
LGO.
SAVE,TAPE1=AERO4.                  RANDOM FILE W/AERO. COEF.
7/8/9                              MULTI-PUNCH
DATA CARDS
6/7/8/9                            MULTI-PUNCH
```

CASE2. If input data is from a permanent file.

```
JOBNAME,CB50000,T10.
ACCOUNT,NUMBER,PASSWORD.
GET,LGO=ACTBIN.
GET,CARDS.
LGO,CARDS.
SAVE,TAPE1=AERO4.
6/7/8/9                            MULTI-PUNCH
```

2. Job Control for Extend Run.

Using the files created in the creation run, the following control cards are necessary to add or replace tables.

This setup can also be used to provide only a listing of the current tables.

CASE1. If input data is from cards

```
JOBNAME,CB50000,T10.
ACCOUNT,NUMBER,PASSWORD.
GET,LGO=ACTBIN.
GET,TAPE1=AERO4.
LGO.
REPLACE,TAPE1=AERO4.
7/8/9 | MULTI-PUNCH
   DATA CARDS
6/7/8/9 | MULTI-PUNCH
```

CASE2. If input data is from a permanent file.

```
JOBNAME,CB50000,T10.
ACCOUNT,NUMBER,PASSWORD.
GET,LGO=ACTBIN.
GET,TAPE1=AERO4.
GET,CARDS.
LGO,CARDS.
REPLACE,TAPE1=AERO4.
6/7/8/9 | MULTI-PUNCH
```

NOTE:

If the "REPLACE" card is not included in the above example, any new tables written to TAPE1 will be lost when the program ends. The "REPLACE" card will not otherwise affect program execution, and may remain in the deck even if no new tables are created.

C. Card Input

1. Card Types

The following are the five different card types that are recognized by the Act Program. Most runs will only require a subset of these, and, unless specified, they must be in the order shown.

All integer data must be right adjusted in their appropriate columns, while all alphanumeric data must be left adjusted.

CARD TYPE 1

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION
I5	1-5	ITYPE	TYPE OF DATA
			= 1 TWO-WAY DATA
			= 2 THREE-WAY DATA
I5	6-10	MODE	TYPE OF RUN
			= 1 CREATION RUN
			= 2 EXTENSION RUN
			= 3 REPLACEMENT RUN
			= 4 SHORT LISTING
			= 5 LONG LISTING

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION
I5	11-15	NOFTAB	NUMBER OF TABLES TO BE PROCESSED
I5	16-20	NTYP	TYPE OF TWO-WAY TABLE = 1 BETA VS MACH = 2 BETA VS ALPHA = 3 ALPHA VS MACH (DEFAULT IS NTYP = 1)

NOTE: ON A LIST RUN (MODE = + OR 5), "NOFTAB" AND "NTYP" DO NOT HAVE TO BE DEFINED.

CARD TYPE 2

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION
8A10	1-80	FMT	THE FORMAT UNDER WHICH THE COEFFICIENTS WILL BE READ

NOTE: CARD TYPES 3, 4, AND 5 MUST BE REPEATED, IN SEQUENCE, "NOFTAB" TIMES.

CARD TYPE 3

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION
A10	1-10	IDENT	TABLE NAME
I5	11-15	NCOEF	NUMBER OF COEFFICIENTS
I5	16-20	ISEQNO	SEQUENCE NUMBER OF THE TABLE TO BE REPLACED (WHEN MODE = 3)

CARD TYPE 4

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION
F8.0	1-8	ALMIN	MINIMUM ALPHA
F8.0	9-16	ALMAX	MAXIMUM ALPHA
F8.0	17-24	DELALP	DELTA ALPHA
F8.0	25-32	BEMIN	MINIMUM BETA
F8.0	33-40	BEMAX	MAXIMUM BETA
F8.0	41-48	DELBET	DELTA BETA
F8.0	49-56	MAMIN	MINIMUM MACH
F8.0	57-64	MAMAX	MAXIMUM MACH
F8.0	65-72	DELMAC	DELTA MACH

WHEN ITYPE = 1 :

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION		
			NTYP=1	NTYP=2	NTYP=3
F8.0	25-32	BEMIN	MIN. BETA	MIN. BETA	MIN. ALPHA
F8.0	33-40	BEMAX	MAX. BETA	MAX. BETA	MAX. ALPHA
F8.0	41-48	DELBET	DELTA BETA	DELTA BETA	DELTA ALPHA
F8.0	49-56	MAMIN	MIN. MACH	MIN. ALPHA	MIN. MACH

FORMAT	COLUMNS	MNEMONIC	DESCRIPTION		
F8.0	57-64	MAMAX	MAX. MACH	MAX. ALPHA	MAX. MACH
F8.0	65-72	DELMAC	DELTA MACH	DELTA ALPHA	DELTA MACH

CARD TYPE 5

FORMAT	COLUMNS	DESCRIPTION
SPECIFIED BY THE USER IN CARD TYPE 2.		TABLE COEFFICIENTS

NOTE: SEE SECTION II.A FOR A FURTHER DESCRIPTION OF HOW THE TABLE COEFFICIENTS MUST BE READ IN.

D. Types of errors that can be found.

1 Number of tables greater than 50.

2 Number of coefficients greater than 500.

3 Invalid use of replace mode.

4 Read excess tables into dummy.

5 Two-way tables fully extended.

6 Attempt to extend two-way tables beyond 30.

7 Three-way tables fully extended.

8 Attempt to extend three-way tables beyond 20.

9 Error in number of coefficients defined.

The Act Program provides a method of continuing execution of the program, despite the discovery of an input error. The user is informed of the error that has been found, which will enable him to correct it in a later

run. In cases where a serious error causes the program to end, the info array for all previously created tables is written to the random file.

Under a "LIST" run (mode = 4 or 5), only card type 1 is recognized. For all other runs, all five card types are required. After each set of input is processed, the next card type 1 is read. The program will terminate upon reading an end of information card.

The program is designed to check for obvious input errors, and make the appropriate adjustments to compensate for them. The subroutine ERMSG handles the printing of the error messages, which indicate the source of the error and the action that will be taken by the program. An attempt is always made to save the "INFO" array before terminating the program due to an input error.

On the following pages is a sample of the inputs needed.

SAMPLE INPUT

```
*** CATALOG RUN ***

   1    1    3    3
(14F5.1)
CXS          95
                                0.        360.     20.      0.       1.2      .3
-1.0 -0.8 -0.4 -0.2  0.0   0.2  0.4  0.8  1.0  0.8  0.7  0.6  0.4  0.0
-0.4 -0.6 -0.8 -0.9 -1.0
-1.0 -0.8 -0.4 -0.2  0.0   0.2  0.4  0.8  1.0  0.8  0.7  0.6  0.4  0.0
-0.4 -0.6 -0.8 -0.9 -1.0
-1.0 -0.8 -0.4 -0.2  0.0   0.2  0.4  0.8  1.0  0.8  0.7  0.6  0.4  0.0
-0.4 -0.6 -0.8 -0.9 -1.0
-1.2 -1.0 -0.6 -0.2  0.2   0.3  0.6  0.9  1.0  0.9  0.7  0.6  0.4  0.0
-0.4 -0.8 -1.0 -1.2 -1.2
-1.3 -1.0 -0.7 -0.2  0.0   0.2  0.5  1.0  1.2  1.0  0.8  0.6  0.4  0.2
-0.4 -0.9 -1.1 -1.2 -1.2
CZS          95
                                0.        360.     20.      0.       1.2      .3
 0.3  0.0 -0.4 -0.5 -0.6  -0.7 -0.8 -0.7 -0.4 -0.2  0.0  0.0  0.3  0.4
 0.5  0.6  0.5  0.4  0.3
 0.3  0.0 -0.4 -0.5 -0.6  -0.7 -0.8 -0.7 -0.4 -0.2  0.0  0.0  0.3  0.4
 0.5  0.6  0.5  0.4  0.3
 0.3  0.0 -0.4 -0.5 -0.6  -0.7 -0.8 -0.7 -0.4 -0.2  0.0  0.0  0.3  0.4
 0.5  0.6  0.5  0.4  0.3
 0.4  0.0 -0.4 -0.6 -0.6  -0.8 -0.7 -0.4  0.0  0.1  0.0  0.1  0.2  0.4
 0.6  0.5  0.6  0.4  0.2
 0.1  0.0 -0.4 -0.7 -0.8  -0.8 -0.9 -0.8 -0.5 -0.2  0.0  0.2  0.4  0.4
 0.6  0.7  0.6  0.5  0.3
CMS          95
                               0.        360.     20.      0.       1.2      .3
-0.10-0.05 0.00 0.10 0.15  0.15 0.15 0.10 0.19-0.08-0.10-0.10-0.10-0.02
 0.0  0.05 0.0 -0.05-0.10
-0.10-0.05 0.00 0.10 0.15  0.15 0.15 0.10 0.19-0.08-0.10-0.10-0.10-0.02
 0.0  0.05 0.0 -0.05-0.10
-0.10-0.05 0.00 0.10 0.15  0.15 0.15 0.10 0.19-0.08-0.10-0.10-0.10-0.02
 0.0  0.05 0.0 -0.05-0.10
```

```
-0.15-0.10 0.0  0.10 0.15 0.17 0.13 0.10 0.05 0.50 0.10 0.15 0.10 0.05
 0.0  0.90 0.0  0.90-0.15
 0.15-0.05 0.0  0.13 0.15 0.19 0.18 0.10 0.05-0.05-0.13-0.18-0.10-0.02
 0.0  0.0  0.02-0.10-0.15



*** EXTEND RUN ***


   1    2    2    1
(14F5.1)
CYS          50
                          0.       45.    5.       0.       1.2      .3
  0.0-0.10-0.15-0.30-0.35-0.50-0.60-0.70-0.85-1.00
  0.0-0.10-0.15-0.30-0.35-0.50-0.60-0.70-0.85-1.00
  0.0-0.10-0.15-0.30-0.35-0.50-0.60-0.70-0.85-1.00
  0.0-0.10-0.20-0.40-0.50-0.60-0.80-0.90-1.00-1.20
  0.0-0.10-0.30-0.50-0.60-0.80-0.90-1.10-1.20-1.40
CLS          50
                          0.       45.    5.       0.       1.2      .3
 0.0 +0.01+0.02+0.04+0.05+0.07+0.09+0.09+0.09+0.08
 0.0 +0.01+0.02+0.04+0.05+0.07+0.09+0.09+0.09+0.08
 0.0 +0.01+0.02+0.04+0.05+0.07+0.09+0.09+0.09+0.08
 0.0 +0.01+0.02+0.04+0.05+0.07+0.09+0.09+0.09+0.08
 0.0 +0.01+0.02+0.04+0.05+0.07+0.09+0.09+0.09+0.08
   1    3    1    1
(14F5.1)
CNS          50   23
                          0.       45.    5.       0.       1.2      .3
  0.0-0.01-0.03-0.05-0.07-0.08-0.10-0.12-0.13-0.14
  0.0-0.01-0.03-0.05-0.07-0.08-0.10-0.12-0.13-0.14
  0.0-0.01-0.03-0.05-0.07-0.08-0.10-0.12-0.13-0.14
  0.0-0.01-0.03-0.05-0.06-0.10-0.12-0.13-0.14-0.15
  0.0-0.02-0.03-0.05-0.08-0.10-0.12-0.13-0.14-0.15
```

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3. Reynolds, John H., "A CDC 6700 Computer Program for Generating Random Files of Equally Spaced Tables for Observed Weather Data," NWL Technical Note TN-K-2/72, Naval Weapons Laboratory, Dahlgren, Virginia, January, 1972.

4. Control Data 6000 Computer Systems "Fortran Extended 3.0 Reference Manual," Publication Number 60176600, Control Data Corporation, October 1971.

5. ACT, A CDC 6700 Computer Program for Generating Random Files of Aerodynamic Coefficient Tables Technical Note TN-K-1/74, Naval Weapons Laboratory, Dahlgren, Virginia, January, 1974.

6. White,. B.J, "Aeromechanical Properties of Ejection Seat Escape Systems", Technical Report AFFDL-TR-74-57, Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio, April, 1974.

APPENDIX E

FORTRAN LISTING OF THE ACT PROGRAM

```
      PROGRAM ACT(INPUT,OUTPUT,TAPE1=51,TAPE16)
      DIMENSION WORK(170,),PUT(8),INDEX(53)
      DIMENSION INFO2(30,10),INFO3(2,13)
      EQUIVALENCE (INFO2(1,1),INFO3(1,1))
      COMMON/SHARE/PUT(8),NOFTAB, TYPE,MODE,IC,ISECND,MTEST,IDLNK
      COMMON/PAGE/IDENT,BAL,BRF,BMA,DELALP,DELBET,DELMAC,ALPHIN,
     1            BGNER,MAMIN,ALMAX,BEMAX,MAMAX,NTYP
      COMMON/NTABS/I200,IBND,ITABNO
      COMMON/PFINFO/INFO2(30,10)
      COMMON/ERCOM/IRCOLF,IERTEST,IJ,IK
      REAL INFO2,INFO3
      REAL BAL,BRF,BMA,MAMIN,MAMAX,IDENT
      IDLNK=10H0000000000
      CALL OPENMS(1,INDEX,53,1)
      TIME=SECOND(SECS)
      IERTEST=
C  THE FIRST CARD OF THE DATA DECK IS  READ
      READ(10,100) ITYPE,MODE,NOFTAB,NTYP
C  ITYPE = 1 DATA FOR TWO-WAY TABLES
C        = 2 DATA FOR THREE -WAY TABLES
C  MODE  = 1 CREATION RUN
C        = 2 EXTENSION RUN
C        = 3 REPLACEMENT RUN
C        = 4 SHORT LISTING
C        = 5 LONG LISTING
C  NOFTAB - NUMBER OF TABLES TO BE READ,
C           NOT DEFINED FOR MODES 4 AND 5
C   NTYP-TYPE OF TWO-WAY TABLE
C        =1 BETA VS MACH
C        =2 BETA VS ALPHA
C        =3 ALPHA VS MACH
100   FORMAT(4I5)
      IF(NTYP.EQ.0)NTYP=1
C  MTEST IS USED BY THE BRINFO AND PTOUT SUBROUTINES
C  MTEST = 0 THE ENTIRE RANDOM FILE CONTAINING THE INFO ARRAY
C            WILL BE READ WHEN MODE = 2 OR 3
C        = 1 NOT NECESSARY TO READ INFO ARRAY AGAIN
C        = 9 INSTRUCTS THE PTOUT ROUTINE TO PRINT OUT
C            THE FILE DICTIONARY ONLY
      MTEST=0
      IF(EOF(10).NE.0)GO TO 99
      IF(ITYPE.EQ.1)NAL=1
C  YOU INITIALIZE THE INFO ARRAY BY SETTING THE IDENT POSITION IN THE
C   INFO ARRAY TO 0000000000 FOR LATER TESTING
      DO 11 J=1,30
      INFO2(J,1)=IDLNK
11    CONTINUE
C  IS THIS JUST A LISTING RUN
      IF(MODE.GE.4)GO TO 98
C  TEST FOR MAX. NUMBER OF TABLES
      IF(NOFTAB.GT.3 .AND.ITYPE.EQ.1)CALL ERMSG(1)
      IF(NOFTAB.GT.2 .AND.ITYPE.EQ.2)CALL ERMSG(1)
C  THE SECOND CARD OF THE DATA DECK GIVES THE FORMAT THAT
C   THE TABLES ARE TO BE READ UNDER
```

```
      C     THE CURRENT TABLE NUMBER
            DO 11 ICOUNT=1,NOFTAB
   60       IF(MODE.NE.2)IC=ICOUNT
            IF(MODE.EQ.2.AND.MTEST.NE.2)IC=IC+1
      C  THE THIRD CARD OF THE DATA DECK DEFINES
      C  IDENT  - THE TABLE NAME
      C  NCOEF  - THE TOTAL NUMBER OF COEFFICIENTS,
   65 C           MUST BE LESS THAN OR EQUAL TO 700
      C  ISFONO - THE SEQUENCE NO. OF THE TABLE TO BE REPLACED(WHEN MODE=3)
      119   READ(12,120) IDENT,NCOEF,ISFONO
      120   FORMAT(A10,I5,I5)
            IF(MODE.EQ.3)GO TO 16
   70       IF(MODE.EQ.2.AND.MTEST.EQ.0)GO TO 16
            IF(ITYPE.EQ.1)INFO2(IC,1)=IDENT
            IF(ITYPE.EQ.2)INFO3(IC,1)=IDENT
      16    IF(NCOEF.GT.700)CALL ERMSG(2)
            IF(IERTEST.EQ.3)GO TO 9
   75       IF(MODE.NE.3)GO TO 14
      C PRIOR TO REPLACING A TABLE, THE RANDOM FILE CONTAINING
      C  THE INFO ARRAY MUST BE READ
            CALL R.INFO(3)
            IF(IERTEST.EQ.3)GO TO 9
   80       IC=ISFONO
            GO TO 15
      C  READ THE INFO ARRAY ON THE FIRST PASS OF AN EXTENSION RUN
      14    IF(MODE.EQ.2.AND.MTEST.EQ.0)CALL WRINFO(2)
            IF(IERTEST.EQ.1)GO TO 12
   85    15    IF(ITYPE.EQ.1)INFO2(IC,1)=IDENT
            IF(ITYPE.EQ.2)INFO3(IC,1)=IDENT
      C   CALL ROUTINE TO READ THE DATA FOR EACH TABLE
            CALL INPUT1(WORKA,NCOEF)
            IF(IERTEST.EQ.4)GO TO 95
   90       INAL=NAL+.03
            INDF=INDF+.03
            INMA=INMA+.03
      C  THE TABLE THAT WAS CREATED IS NOW PRINTED OUT
            CALL PTOUT(WORKA,INAL,INDF,INMA)
   95    9     IF(IERTEST.EQ.3)IERTEST=
      C  THIS PROCESS IS CARRIED OUT UNTIL ALL TABLES, AS SPECIFIED
      C   BY NOFTABS, HAVE BEEN READ
      11    CONTINUE
            IF(IERTEST.EQ.2)CALL ERMSG(4)
  100 C  AFTER ALL TABLES HAVE BEEN CREATED, THE INFO ARRAY IS
      C    WRITTEN TO THE PROPER RANDOM FILE
      95    CALL WRINFO(1)
            IF(ITYPE.EQ.2)I3=0=IC
            IF(ITYPE.EQ.1)I2=0=IC
  105       IF(IC.EQ.0)GO TO 9
            IF(MODE.EQ.3)CALL WRINFO(2)
            ITEST=0
      C  THE PTOUT ROUTINE NOW PRINTS OUT THE FILE DICTIONARY
            CALL PTOUT(WORKA,1,1)
  110       GO TO 94
      C  ON LIST OPTION, DETERMINE THE NUMBER OF TABLES ON FILE
```

```
      115               IF(ITYPE.EQ.2)NT=13NO
                        NTEST=1
                        DO 2  IC=1,11
                  C  READ THE AERODYNAMIC COEFFICIENTS INTO MEMORY
                        CALL READAE(IC,WORKA)
      120               INAL=NAL+.50
                        INDE=NDE+.50
                        INMA=NMA+.50
                  C  PRINT OUT THE TABLE
                        CALL PLOUT(WORKA,INAL,INDE,INMA)
      125           2   CONTINUE
                    97  NTEST=4
                        CALL PLOUT(WORKA,1,1,1)
                  C  PRINT OUT CP TIME USED
                    94  TIME=SECOND(SECS)-TIME
      130               IHOURS=TIME/3600.
                        MINS=AMOD(TIME,3600.)/60.
                        ISECS=TIME-FLOAT(MINS*60+IHOURS*3600)
                        PRINT 93,IHOURS,MINS,ISECS
                    93  FORMAT(1H0,15X,41HCENTRAL PROCESSOR TIME FOR THIS CASE WAS ,I3,
      135           1       6H HOURS,I3,5H MINS,I3,5H SECS)
                        IF(IERTEST.EQ.4)STOP
                        GO TO 12
                    99  STOP
                        END
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

```
     5    1     FMT :     PREVIOUSLY DIMENSIONED ARRAY. FIRST DIMENSIONS WILL BE RETAINED.
     9    1     INFO3     PREVIOUSLY DIMENSIONED ARRAY. FIRST DIMENSIONS WILL BE RETAINED.
   117    1               CONTROL VARIABLE IN COMMON OR EQUIVALENCED, OPTIMIZATION MAY BE INHIBITED.
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS DEF LINE REFERENCES

```
 7221  ACT          1
```

VARIABLES	SN	TYPE		RELOCATION				
12 ALMAX		REAL		RANGE	DEFS	6		
7 ALMIN		REAL		RANGE	DEFS	6		
13 DEMAX		REAL		RANGE	DEFS	6		
1 DEMIN		REAL		RANGE	DEFS	6		
4 DELALP		REAL		RANGE	DEFS	6		
5 DELRET		REAL		RANGE	DEFS	6		
6 DELMAC		REAL		RANGE	DEFS	6		
FMT		REAL	ARRAY	SHARE	DEFS	2	5 DEFINED	55

VARIABLES	SN	TYPE		RELOCATION						
0	ICENT	REAL		RANGE	REFS	6	12	71	72	85	86
					DEFINED	67					
1	IERTEST	INTEGER		ERCOM	REFS	10	74	79	84	89	95
					136	DEFINED	16	95			
7654	IHOURS	INTEGER			REFS	132	133	DEFINED	130		
2	IJ	INTEGER		ERCOM	REFS	10					
3	IK	INTEGER		ERCOM	REFS	10					
765	INAL	INTEGER			REFS	94	124	DEFINED	90	120	
7651	INBE	INTEGER			REFS	94	124	DEFINED	91	121	
11153	INDEX	INTEGER	ARRAY		REFS	2	14				
	INFO2	REAL	ARRAY	REFINFO	REFS	3	4	9	11	DEFINED	46
					85						
	INFO3	REAL	ARRAY	REFINFO	REFS	3	4	11	DEFINED	72	86
7652	INNA	INTEGER			REFS	94	124	DEFINED	92	122	
7656	ISECS	INTEGER			REFS	133	DEFINED	132			
14	ISEQ=0	INTEGER		SHARE	REFS	5	DEFINED	67			
2	ITAB=0	INTEGER		DTABS	REFS	8	83				
11	ITYPE	INTEGER		SHARE	REFS	5	42	51	52	71	72
					86	103	104	114	115	DEFINED	10
0	I2=0	INTEGER		DTABS	REFS	8	114	DEFINED	104		
1	I3=0	INTEGER		DTABS	REFS	8	115	DEFINED	103		
7646	J	INTEGER			REFS	46	DEFINED	45			
14	NAMAX	REAL		RANGE	REFS	6	12				
11	NAMIN	REAL		RANGE	REFS	6	12				
7655	NINS	INTEGER			REFS	132	133	DEFINED	131		
12	NODE	INTEGER		SHARE	REFS	5	49	66	61	69	70
					83	106	111	DEFINED	10		
15	NTEST	INTEGER		SHARE	REFS	5	61	70	81	DEFINED	40
					116	126					
1	NAL	REAL		RANGE	REFS	6	12	90	120	DEFINED	42
2	NBE	REAL		RANGE	REFS	6	12	91	121		
	NCDEF	INTEGER		ERCOM	REFS	10	77	88	DEFINED	47	
3	NNA	REAL		RANGE	REFS	6	12	92	122		
13	NOFTAB	INTEGER		SHARE	REFS	5	51	52	59	DEFINED	10
7653	NT	INTEGER			REFS	117	DEFINED	114	115		
15	NTYP	INTEGER		RANGE	REFS	6	31	DEFINED	18	33	
7645	SECS	REAL			REFS	15	129				
7644	TIME	REAL			REFS	129	130	131	132	DEFINED	15
7657	WORKA	REAL	ARRAY		REFS	2	88	94	109	119	124

FILE NAMES	MODE				
INPUT					
2643 OUTPUT	FMT		WRITES	133	
4136 LABEL					
5151 TAPE10	FMT		READS	18	55	67

EXTERNALS	TYPE	ARGS	REFERENCES			
EOF	REAL	1	41			
EXPSG		1	51	52	73	99
INPUTT		2	48			
UNPACK		4	14			
PRINT		4	94	109	124	127

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
AMOD	REAL	2	INTRIN	131
FLOAT	REAL	1	INTRIN	132

STATEMENT LABELS			DEF LINE	REFERENCES	
7376	9		95	74	79
	11		98	59	
7225	12		15	84	137
	13		47	45	
7342	14		83	75	
7352	15		85	81	
7325	16		73	69	70
	20		125	117	
7615	93	FMT	134	133	
747[illegible]	94		129	105	110
7467	95		142	89	
7465	97		126	113	
7432	98		112	49	
7513	99		134	41	
7564	100	FMT	32	18	
7571	11[illegible]	FMT	56	55	
	119	INACTIVE	67		
7604	120	FMT	68	67	

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
7247	13	J	45 47	38	INSTACK		
7273	11	* ICOUNT	59 98	1119		EXT REFS	EXITS
7456	20	* IC	117 125	150		EXT REFS	

COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME(LENGTH)					
SHARE	15	0 FIT (8)	8 NOFTAB (1)	9 ITYPE (1)			
		10 NODE (1)	11 IC (1)	12 ISECND (1)			
		13 NTEXT (1)	14 IRLNK (1)				
RANGE	14	0 IDENT (1)	1 NAL (1)	2 NRE (1)			
		3 NRA (1)	4 DELALP (1)	5 DELRET (1)			
		6 DELMAC (1)	7 ALMIN (1)	8 DEMIN (1)			
		9 MAMIN (1)	10 ALMAX (1)	11 DEMAX (1)			
		12 MAMAX (1)	13 NTYP (1)				
BTAB	3	0 I2ND (1)	1 I3ND (1)	2 ITABND (1)			
BFINFO	300	0 INFO2 (300)					
EQCOM	4	0 NCOEF (1)	1 IERTEST (1)	2 IJ (1)			
		3 IK (1)					

EQUIV CLASSES	LENGTH	MEMBERS - BIAS NAME(LENGTH)
INFO2 INFO3	300	0 INFO1 (260)

STATISTICS

PROGRAM LENGTH	2025H	1045
BUFFER LENGTH	7213H	3723
CM LABELED COMMON LENGTH	527H	316

```
      1            SUBROUTINE ERMSG(IERNO)
                 C  THE SUBROUTINE ERMSG IS CALLED WHENEVER AN ERROR IS DETECTED.
                 C   IT PRINTS OUT AN APPROPRIATE ERROR MESSAGE AND TAKES THE NECESSARY
                 C   CORRECTIVE ACTION.  A FLAG (ERTEST) IS SET AND PASSED
      5          C   TO THE CALLING ROUTINE.
                 C  ERTEST = 1  PRESENT CASE IGNORED, READ NEXT TYPE 1 CARD
                 C         = 2  AFTER PROCESSING NOFTAB TABLES, RETURN TO ERMSG ROUTINE
                 C              TO READ REMAINING TABLES INTO DUMMY
                 C         = 3  DISREGARD PRESENT TABLE, CONTINUE READING NEXT TABLE
     10          C         = 4  STOP PROGRAM AFTER PROCESSING NOFTAB TABLES
                       DIMENSION ITYP(2)
                       COMMON/ERCOM/NCOEF,ERTEST,IJ,IK
                       COMMON/SHARE/ERT(8),NOFTAB,ITYPE,MODE,IC,ISEQNO,NTEST,IDLNK
                       INTEGER ERTEST
     15                DATA ITYP/2,3/
                       GO TO (10,20,30,40,50,60,70,80,90),IERNO
                  1    PRINT 11
                  11   FORMAT(1H1///1X,***** ERROR ***** ATTEMPTING TO INPUT MORE THAN THE MAXIMUM
                      1 NUMBER OF TABLES ALLOWED)
     20                GO TO (14,15),ITYPE
                  14   PRINT 12,ITYP(2)
                  12   FORMAT(15X,23HPROGRAM WILL END AFTER ,I1,26H0 TABLES HAVE BEEN CRE
                      1ATED)
                       NOFTAB=30
     25                GO TO 16
                  15   PRINT 12,ITYP(1)
                       NOFTAB=20
                  16   ERTEST=4
                       RETURN
     30           20   PRINT 21
                  21   FORMAT(15X,59H1***** ERROR ***** ATTEMPT TO DEFINE MORE THAN 700 COEFFICIE
                      1NTS)
                       PRINT 22
                  22   FORMAT(15X,61HTHIS TABLE IS DISREGARDED - PROGRAM CONTINUES WITH N
     35               1EXT TABLE)
                  24   READ(1,25) DUMMY
                  25   FORMAT(A1)
                       READ(1,FMT) (DUMMY,I=1,NCOEF)
                       ERTEST=3
     40                RETURN
                  3    PRINT 31
                  31   FORMAT(1H1///1X,68H***** ERROR ***** ATTEMPTING TO USE THE REPLACE MODE TO REP
                      1LACE A TABLE,/,19X,29HTHAT HAS NOT YET BEEN DEFINED)
                       PRINT 22
     45                GO TO 24
                  5    PRINT 51,ITYP(1)
                  51   FORMAT(1H1///1X,29H***** ERROR ***** MAX. NUMBER OF,I2,27H-WAY TABLES ALREADY
                      1DEFINED,/,15X,24HTHEY CAN NOT BE EXTENDED)
                       PRINT 52
     50                GO TO 24
                  6    PRINT 61
                  61   FORMAT(15X,56HEXTENSION TABLES ARE DISREGARDED AND EXECUTION CONTI
                      1NUES)
                  62   READ(1,25) DUMMY
                       READ(1,FMT) (DUMMY,I=1,NCOEF)
                       IF(ERTEST.EQ.0) GO TO 62
```

```
                      READ(1,*,ERR=1) DUMMY
                      READ(1,*,ERR=1) (DUMMY,I=1,NCOEF)
      60        55    CONTINUE
                50    ENTRY=1
                      RETURN
                6     PRINT 61,ITYP(1)
                61    FORMAT(39H1*** ERROR *** ATTEMPTING TO EXTEND THE,I2,32H-WAY TABLE
      65              1S BEYOND THEIR MAXIMUM)
                      PRINT 62
                62    FORMAT(15X,70HTABLES WILL BE EXTENDED TO THEIR MAXIMUM AND THE REM
                     1AINDER DISREGARDED)
                      LEFT=NOFTAB
      70              NOFTAB=31-IJ
                65    LEFT=LEFT-NOFTAB
                      ENTRY=2
                      RETURN
                7     PRINT 51,ITYP(2)
      75              GO TO 52
                8     PRINT 61,ITYP(2)
                      LEFT=NOFTAB
                      NOFTAB=21-IK
                      GO TO 65
      80        46    NOFTAB=LEFT+1
                      GO TO 57
                9     PRINT 91
                91    FORMAT(77H1*** ERROR *** NUMBER OF GIVEN DOES NOT EQUAL NUMBER OF
                     1COMPUTED COEFFICIENTS,/,15X,49HPROGRAM WILL END AFTER WRITING INFO
      85             2 ARRAY TO FILE)
                      ENTRY=4
                      RETURN
                      END
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

20 1 AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS DEF LINE REFERENCES

3 ERMSG 1 24 4 62 73 87

VARIABLES	SN	TYPE		RELOCATION							
67	DUMMY	REAL			DEFINED	36	38	52	53	58	59
1	ENTRY	INTEGER		FWCOM	REF	12	14	DEFINED	28	39	61
					86						
	FNT	REAL	ARRAY	SHARE	REF	13	38	53	59		
470	I	INTEGER			DEFINED	30	53	55			
16	IMLIM	INTEGER		SHARE	REF	13					
13	IP	INTEGER		SHARE	REF	13					

VARIABLES	SN	TYPE	RELOCATION						
2	IJ	INTEGER	ERCOM	REFS	12	78			
3	IK	INTEGER	ERCOM	REFS	12	78			
14	ISRCMD	INTEGER	SHARE	REFS	13				
473	ITYP	INTEGER	ARRAY	REFS	11	21	26	46	63	74
				DEFINED	15					
11	ITYPE	INTEGER	SHARE	REFS	13	20				
471	J	* INTEGER		DEFINED	59					
472	LEFT	INTEGER		REFS	71	80	DEFINED	69	71	77
12	MODE	INTEGER	SHARE	REFS	13					
15	NTEST	INTEGER	SHARE	REFS	13					
.	NCOLF	INTEGER	ERCOM	REFS	12	38	53	59	DEFINED	56
13	NOFTAB	INTEGER	SHARE	REFS	13	54	55	69	71	77
				DEFINED	24	27	70	78	80	

FILE NAMES	MODE							
OUTPUT	FMT	WRITES	17	21	26	30	33	41	44
		49	63	66	74	76	82		
TAPE10	FMT	READS	36	38	52	53	56	58	59

STATEMENT LABELS			DEF LINE	REFERENCES		
23	1		17	16		
172	11	FMT	18	17		
21	12	FMT	22	21	26	
34	14		21	2		
4	15		26	2		
43	16		28	25		
45	2		3	16		
227	21	FMT	31	3		
242	22	FMT	34	33	44	
51	24		36	45		
257	25	FMT	37	36	52	58
65	3		41	16		
273	31	FMT	42	41		
160	4		8	16		
72	5		46	16		
316	51	FMT	47	44	74	
76	52		51	75		
334	53	FMT	5	49		
6	55		6	55		
365	56	FMT	57	56		
112	57		55	41		
132	58		61	54		
134	6		63	16		
407	61	FMT	64	63	76	
424	62	FMT	67	66		
143	65		71	79		
147	7		74	16		
152	8		76	16		
163	9		82	16		
45	91	FMT	83	42		

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
56		* I	38 38	40	EXT REFS
133		* I	53 53	40	EXT REFS

SUBROUTINE EHMSG 74/74 OPT=1 FTN 4.6+428 81/03/18. 11.19.26 PAGE

COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)

EHCOM	4	0 NCDEF (1)	1 ERTEST (1)	2 IJ (1)
		3 IK (1)		
SHARE	15	6 FPT (8)	8 NOFIAU (1)	9 ITYPE (1)
		10 MODE (1)	11 IC (1)	12 ISEQNO (1)
		13 MTEST (1)	14 IALNK (1)	

STATISTICS

PROGRAM LENGTH	475B	317
CM LABELED COMMON LENGTH	23B	19

```
      SUBROUTINE INPUTT(WORKA,NCOEF)
C  INPUTT READS CARD TYPES 4 AND 5 AND DEFINES THE INFO ARRAY
      DIMENSION WORKA(NCOEF)
      DIMENSION INFO2(30,16),INFO3(20,13)
      EQUIVALENCE (INFO2(1,1),INFO3(1,1))
      COMMON/SHARE/FMT(8),NOFTAB,ITYPE,MODE,IC,ISEQNO,NTEST,IDLNK
      COMMON/RFINFO/INFO2(30,16)
      COMMON/PANDE/IPLOT,NAL,NBE,NHA,DELALP,DELBET,DELMAC,ALMIN,
     1             BEMIN,MAMIN,ALMAX,BEMAX,MAMAX,NTYP
      COMMON/ERCOM/IERCO,IERTEST,I,IK
      READ  INFO2,INFO3
      READ NAL,NBE,NHA,MAMIN,MAMAX,IDENT
C  THE FOURTH CARD OF THE DATA DECK CONTAINS INFO. FOR
C   THE GENERATION OF THE TABLES
C  READ THE MAX, MIN, AND DELTA FOR ALPHA, BETA, AND MACH
      READ(1,200) ALMIN,ALMAX,DELALP,BEMIN,BEMAX,DELBET,MAMIN,MAMAX,
     1            DELMAC
  200 FORMAT(10F8.3)
C  CALCULATE  THE NUMBER OF BETA AND MACH
      NBE=(BEMAX-BEMIN)/DELBET+1.0
      NHA=(MAMAX-MAMIN)/DELMAC+1.0
      IF(ITYPE.EQ.1)GO TO 2
C   INFO ARRAY FOR 3-WAY TABLES
C  COMPUTE NUMBER OF ALPHA WHEN CREATING 3-WAY TABLES
      NAL=(ALMAX-ALMIN)/DELALP+1.0
      INFO3(IC,2)=NAL
      INFO3(IC,3)=NBE
      INFO3(IC,4)=NHA
C  DOES THE NUMBER OF ALPHA, BETA, AND MACH AGREE WITH
C   THE GIVEN NUMBER OF COEFFICIENTS
      MYCOEF=NAL*NBE*NHA+.5
      IF(NCOEF.NE.MYCOEF)CALL ERMSG(9)
      IF(IERTEST.EQ.4)GO TO 32
      INFO3(IC,5)=DELALP
      INFO3(IC,6)=DELBET
      INFO3(IC,7)=DELMAC
      INFO3(IC,8)=ALMIN
      INFO3(IC,9)=BEMIN
      INFO3(IC,10)=MAMIN
      INFO3(IC,11)=ALMAX
      INFO3(IC,12)=BEMAX
      INFO3(IC,13)=MAMAX
      NUMA=NAL+.5
      NUMB=NBE+.5
      NUMM=NHA+.5
      GO TO 21
C   INFO ARRAY FOR 2-WAY TABLES
    2 INFO2(IC,2)=NBE
      INFO2(IC,3)=NHA
      MYCOEF=NBE*NHA+.5
      IF(NCOEF.NE.MYCOEF)CALL ERMSG(9)
      IF(IERTEST.EQ.4)GO TO 31
      INFO2(IC,4)=DELBET
      INFO2(IC,5)=DELMAC
```

```
                  INFO2(IC,9)=NAMAX
                  INFO2(IC,10)=NTYP
      60          NUMA=NAL+0.5
                  NUMB=NBE+0.5
                  NUMR=NMA+0.5
            C  READ THE DATA FOR THE NEXT TABLE
            C  STIPULATE THAT THE DATA MUST BE READ IN THE
      65    C  FOLLOWING ORDER - C(ALPHA,BETA,MACH),ALPHA=1,NAL
            C                                      BETA=1,NBE
            C                                      MACH=1,NMA
            C  READ TWO-WAY TABLE DATA
               DO 22 J=1,NUMR
      70    22    READ(10,END=1) (WORKA((J-1)*NUMB+I),I=1,NUMB)
               GO TO 23
            C  READ THREE-WAY TABLE DATA
            21    DO 25 J=1,NUMR
                  DO 25 K=1,NUMB
      75          READ(10,END=1) (WORKA((J-1)*NUMB*NUMA+(K-1)*NUMA+I),I=1,NUMA)
            25    CONTINUE
            23    IRF=IC
                  IF(ITYPE.EQ.1)IRF=200+IC
                  IF(ITYPE.EQ.3)IRF=1500+IC
      80    C  WRITE THE DATA ON THE RANDOM FILE SPECIFIED BY IRF
                  CALL WRITMS(10,WORKA,NCOEF,IRF)
                  RETURN
            C  WHEN THE NUMBER OF COEFFICIENTS IS IN ERROR, BLANK OUT
            C   INFO2 FIELD BEFORE WRITING INFO ARRAY TO RANDOM FILE
      85    31    INFO2(IC,1)=IBLNK
            33    IC=IC-1
                  RETURN
            32    INFO3(IC,1)=IBLNK
                  GO TO 33
      90          END
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

7 1 INFO2 PREVIOUSLY DIMENSIONED ARRAY. FIRST DIMENSIONS WILL BE RETAINED.

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES

3 INPUTT 1 82 87

VARIABLES	SN	TYPE	RELOCATION						
12 ALMAX		REAL	RANGE	REF	A	25	40	DEFINED	16
7 ALMIN		REAL	RANGE	REF	A	25	37	DEFINED	16
13 BEMAX		REAL	RANGE	REF	A	2	41	57	DEFINED 16
10 BEMIN		REAL	RANGE	REF	A	2	38	55	DEFINED 16
4 DELALP		REAL	RANGE	REF	A	25	34	DEFINED	16
5 DELBET		REAL	RANGE	REF	A	2	35	53	DEFINED 16

VARIABLES	SN	TYPE		RELOCATION							
6	DELMAG	REAL		RANGE	REFS	8	21	36	54	DEFINED	16
7	FMT	REAL	ARRAY	SHARE	REFS	6	7	75			
276	I	INTEGER			REFS	73	75	DEFINED	76	75	
16	IHLPIK	INTEGER		SHARE	REFS	6	85	88			
13	IC	INTEGER		SHARE	REFS	6	26	27	28	34	35
						37	38	39	40	41	42	48
						53	54	55	56	57	58	59
						78	85	86	88	DEFINED	86	
5	IDENT	REAL		RANGE	REFS	8	12				
1	IERTEST	INTEGER		ERCOM	REFS	10	33	52			
2	IJ	INTEGER		ERCOM	REFS	10					
3	IK	INTEGER		ERCOM	REFS	10					
	INFO2	REAL	ARRAY	RFINFO	REFS	4	5	7	11	DEFINED	48
						53	54	55	56	57	58	59
8	INFO3	REAL	ARRAY	RFINFO	REFS	4	5	11	DEFINED	26	27
						34	35	36	37	38	39	40
						42	88				
300	IRF	INTEGER			REFS	81	DEFINED	77	78	79	
14	ISEQ=0	INTEGER		SHARE	REFS	6	79				
11	ITYPE	INTEGER		SHARE	REFS	6	22	78			
275	J	INTEGER			REFS	70	75	DEFINED	69	73	
277	K	INTEGER			REFS	75	DEFINED	74			
14	HAMAX	REAL		RANGE	REFS	8	12	21	42	58	
					DEFINED	16					
11	HAMIN	REAL		RANGE	REFS	8	12	21	39	56	
					DEFINED	16					
12	MODE	INTEGER		SHARE	REFS	6	79				
15	NTEST	INTEGER		SHARE	REFS	6					
271	MYCOEF	INTEGER			REFS	32	51	DEFINED	31	50	
1	NAL	REAL		RANGE	REFS	8	12	26	31	43	60
					DEFINED	25					
2	NHE	REAL		RANGE	REFS	8	12	27	31	44	48
						61	DEFINED	2			
4	NCOEF	INTEGER		F.P.	REFS	3	32	51	81	DEFINED	1
3	NHA	REAL		RANGE	REFS	8	12	28	31	45	49
						62	DEFINED	21			
1	NOPT/8	INTEGER		SHARE	REFS	6					
15	NTYP	INTEGER		RANGE	REFS	8	59				
272	NUMA	INTEGER			REFS	3*75	DEFINED	43	60		
273	NUMB	INTEGER			REFS	2*70	74	75	DEFINED	44	61
	NUMCO	INTEGER		ERCOM	REFS	10					
274	NUMM	INTEGER			REFS	69	73	DEFINED	45	62	
	WORKA	REAL	ARRAY	F.P.	REFS	3	81	DEFINED	1	70	75

FILE NAMES	MODE			
TAPE10	FMT	READS	16	70 75

EXTERNALS	TYPE	ARGS	REFERENCES	
ERMSG		1	32	51
WRITMS		4	41	

STATEMENT LABELS		DEFINED	REFERENCES
72	2	40	22
146	21	73	46
	22	7	40

```
STATEMENT LABELS                    DEF LINE   REFERENCES
  211  31                              85         52
  215  32                              88         33
  213  33                              8[illegible]         89
  245  2[illegible]0     FMT               16         16

LOOPS  LABEL    INDEX      FROM-TO    LENGTH    PROPERTIES
  126  22      * J          69 70       250     EXT REFS  NOT INNER
  131          * I          70 70       110     EXT REFS
  147  25      * J          73 76       250     EXT REFS  NOT INNER
   15  25      * K          74 76       220     EXT REFS  NOT INNER
  153          * I          75 75       130     EXT REFS

COMMON BLOCKS   LENGTH     MEMBERS - BIAS NAME(LENGTH)
       SHAPE        15              0 FMT     (8)          8 NOFTAB (1)          9 ITYPE  (1)
                                   10 NODE    (1)         11 IC     (1)         12 ISEQNO (1)
                                   13 NTEXT   (1)         14 IBLNK  (1)
       NFINFO      300              0 INFO2   (300)
       RANGE        14              0 IPLNT   (1)          1 NAL    (1)          2 NBE    (1)
                                    3 NRA     (1)          4 DELALP (1)          5 DELBET (1)
                                    6 DELMAC  (1)          7 ALMIN  (1)          8 BEMIN  (1)
                                    9 HAMIN   (1)         10 ALMAX  (1)         11 BEMAX  (1)
                                   12 HAMAX   (1)         13 NTYP   (1)
       ERCON         4              0 NUMCO   (1)          1 IERTEST(1)          2 IJ     (1)
                                    3 IK      (1)

EQUIV CLASSES   LENGTH     MEMBERS - BIAS NAME(LENGTH)
INFO2   INFO2       300              0 INFO3   (260)

STATISTICS
  PROGRAM LENGTH                3 6B      194
  CM LABELED COMMON LENGTH      515B      333
```

```
      SUBROUTINE PTOUT(NOPKA,NAL,NBE,NMA)
C  THIS SUBROUTINE PRINTS THE AERODYNAMIC COEFFICIENT TABLES
C   ON THE FILE DICTIONARY
      DIMENSION NOPKA(NAL,NBE,NMA)
      DIMENSION ALPH(250),BETA(250),MACH(250)
      DIMENSION INFO2(30,13),INFO3(20,13)
      DIMENSION OPT(5),TABNO(2),DICT1(2),DICT2(11)
      EQUIVALENCE (INFO2(1,1),INFO3(1,1))
      COMMON/SHARE/FMT(8),NUMTAB,ITYPE,NODE,IC,ISECNO,MTEST,IDLNK
      COMMON/RANGE/IDENT,NALP,NBET,NMAC,DELALP,DELBET,DELMAC,ALMIN,
     1             BEMIN,MAMIN,ALMAX,BEMAX,MAMAX,MTYP
      COMMON/NTAMS/I2NO,I3NO
      COMMON/FTINFO/INFO2(30,13),INFO3(20,13)
      INTEGER OPT,TABNO,DICT1,DICT2,TABTST
      REAL INFO2,INFO3
      REAL NALP,NBET,NMAC,MAMIN,MAMAX,MACH,IDENT
      DATA DICT1/10HSEQUENCE  ,10HTABLE     /
      DATA DICT2/10HNUMBER    ,10HIDENTIFIER,10H     ALMIN,
     1           10H     ALMAX,10H     DELALP,10H     BEMIN,
     2           10H     BEMAX,10H     DELBET,10H     MAMIN,
     3           10H     MAMAX,10H     DELMAC/
      DATA OPT,TABNO/7HCREATE ,7HEXTEND ,7HREPLACE,2*7HLIST   ,
     1               5H  TWO,5HTHREE/
C  WHEN MTEST=9, YOU JUST PRINT OUT THE FILE DICTIONARY
      IF (MTEST.EQ.9)GO TO 40
      N1=1
      NMMA=NMA
C  TABTST SET = 1 WHEN A LINE IS CONTINUED
C  NCOUNT USED TO INCREMENT THE NMA VALUES
30    TABTST=0
      NCOUNT=0
      IF (ITYPE.EQ.1)GO TO 31
C  COMPUTE ALPHA(I), BETA(I), AND MACH(I), USING THE
C   MIN., MAX., AND DELTA VALUES FOR THESE VARIABLES
      ALPH(1)=ALMIN
      DO 23 I=2,NAL
      ALPH(I)=ALPH(I-1)+DELALP
23    CONTINUE
31    MACH(1)=MAMIN
      DO 24 I=2,NMA
      MACH(I)=MACH(I-1)+DELMAC
24    CONTINUE
      BETA(1)=BEMIN
      DO 25 I=2,NBE
      BETA(I)=BETA(I-1)+DELBET
25    CONTINUE
C  PRINT TABLE HEADER, NAME, AND NUMBER
      PRINT 140,OPT(NODE),TABNO(ITYPE)
140   FORMAT(1H1,A8,2H ,A8,2HOPTION FOR RANDOM FILE OF ,
     1       A5,12H-WAY TABLES,)
      IN=1
      IF(ITYPE.EQ.1)N=IC+2
      PRINT 142,N
142   FORMAT(/,16H TABLE NUMBER = ,I1)
      PRINT 15,IDENT
```

```
                      ISAVNA=NNA
                      DO 24 L=1,NAL
   60                 PRINT 17, LPH(L)
                  170 FORMAT(///,20X,18HANGLE OF ATTACK = ,E10.4)
                  C  PRINT THE NNE * NMA TABLE, FOR 3-WAY TABLES,
                  C    THERE WILL BE NAL SUB-TABLES
                  177 CONTINUE
   65             26  PRINT 174
                  174 FORMAT(//,19H ANGLES OF)
                  C  PRINT HEADINGS ACCORDING TO ITYPE
                      GO TO (32,33,34),ITYP
                  32  PRINT 171
   70             171 FORMAT(9H SIDESLIP,T36,12HMACH NUMBERS,/)
                  181 IF(NNA.GT.8)GO TO 191
                  176 CONTINUE
                      PRINT 172,(MACH(I),I=N1,NNNA)
                  172 FORMAT(T13,8(E10.4,5X))
   75             PRINT 175
                  175 FORMAT(2H )
                      IF(ITYPE.EQ.1)GO TO 27
                      DO 22 M=1,NNE
                      PRINT 173,BETA(M),(WORKA(L,M,N),N=N1,NNNA)
   80             173 FORMAT(E11.4,T13,8(E15.8))
                  22  CONTINUE
                  24  IF(LAST.EQ.1)GO TO 192
                      N1=1
                      NCARY=1
   85                 NNA=ISAVNA
                  25  CONTINUE
                      RETURN
                  27  DO 28 M=1,NNE
                      PRINT 173,BETA(M),(WORKA(1,M,N),N=N1,NNNA)
   90             28  CONTINUE
                      IF(LAST.EQ.1)GO TO 192
                      RETURN
                  C  IF THERE ARE MORE THAN 8 MACH VALUES, THE TABLE MUST BE CONTINUED
                  C   ON ANOTHER LINE
   95             19  NNAMR=NNA-8
                      NNA=8+NCARY
                      NCARY=8
                      TABLET=1
                      GO TO 176
  100             192 NNA=NNAMR
                      TABLET=2
                      N1=N1+8
                      NNNA=NNNA+NNA
                      GO TO 177
  105             31  PRINT 10,
                  10  FORMAT(19H SIDESLIP,T3 ,15HANGLE OF ATTACK,/)
                      GO TO 181
                  34  PRINT 192
                  192 FORMAT(2H ATTACK,T33,12HMACH NUMBERS,/)
  110             GO TO 181
                  C
                  C
```

```
      115               PRINT 100,I3NO,TABNO(2)
                  100   FORMAT(//,31H1THIS RANDOM FILE NOW CONTAINS,I3,1X,A5,
                     1        12H-WAY TABLES.)
                        GO TO 102
                  101   PRINT 100,I2NO,TABNO(1)
      120         102   PRINT 110
                  110   FORMAT(//,24H FILE DICTIONARY FOLLOWS.//)
                        PRINT 120,DICT1
                  120   FORMAT(1X,11A10,/)
                        PRINT 120,DICT2
      125               IF(ITYPE.EQ.1)GO TO 131
                        DO 121 J=1,I3D0
                        IDENT=INF03(J,1)
                        PRINT 130,J,IDENT,INF03(J,8),INF03(J,11),INF03(J,5),
                     1             INF03(J,9),INF03(J,12),INF03(J,6),INF03(J,10),
      130            2             INF03(J,13),INF03(J,7)
                  130   FORMAT(I3,8X,A10,9F10.4)
                  121   CONTINUE
                        RETURN
                  131   DO 132 J=1,I2D0
      135               K=J+2D
                        IDENT=INF02(J,1)
                        ITYP=INF02(J,10)
                  C  PRINT VALUES IN CORRECT COLUMNS
                  C  CHECK PRIOR TYPE OF TWO-WAY TABLE
      140               GO TO (123,124,125),ITYP
                  123   PRINT 134,K,IDENT,INF02(J,6),INF02(J,8),INF02(J,4),
                     1             INF02(J,7),INF02(J,9),INF02(J,5)
                  134   FORMAT(I3,8X,A10,30X,6F10.4)
                        GO TO 132
      145         124   PRINT 13?,K,IDENT,INF02(J,7),INF02(J,9),INF02(J,5),
                     1       INF02(J,6),INF02(J,8),INF02(J,4)
                        GO TO 132
                  125   PRINT 135,K,IDENT,INF02(J,6),INF02(J,8),INF02(J,4),
                     1       INF02(J,7),INF02(J,9),INF02(J,5)
      150         135   FORMAT(I3,8X,A10,3F10.4,30X,3F10.4)
                  132   CONTINUE
                        RETURN
                        END
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
13	I	INF02	PREVIOUSLY DIMENSIONED ARRAY. FIRST DIMENSIONS WILL BE RETAINED.
68	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
140	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
153	I	50	NON-INNER LOOP BEGINNING AT THIS CARD IS ENTERED FROM OUTSIDE ITS RANGE.

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS

		DEF LINE	REFERENCES			
3	PTOUT	1	87	92	133	152

VARIABLES

	SN	TYPE		LOCATION						
12	ALMAX	REAL			RANGE	REF	14			
7	ALMIN	REAL			RANGE	REF	15	35		
722	ALPH	REAL	ARRAY			REFS	5	37	66	DEFINED 35 37
13	BEMAX	REAL			RANGE	REFS	10			
10	BEMIN	REAL			RANGE	REFS	10	43		
1314	BETA	REAL	ARRAY			REFS	5	45	79	89 DEFINED 43
4	DELALP	REAL			RANGE	REFS	10	37		
5	DELBET	REAL			RANGE	REFS	10	45		
6	DELMAC	REAL			RANGE	REFS	10	41		
2307	DICT1	INTEGER	ARRAY			REFS	7	14	122	DEFINED 17
2311	DICT2	INTEGER	ARRAY			REFS	7	14	124	DEFINED 18
2	FNI	REAL	ARRAY		SHARE	REFS	9			
711	I	INTEGER				DEF	2*37	2*41	2*45	73 DEFINED 36
							44	71		
16	IBLNK	INTEGER			SHARE	REFS	9			
13	IC	INTEGER			SHARE	REFS	9	51	52	
3	IDENT	REAL			RANGE	REFS	10	16	55	128 141 145
						DEFINED	127	136		
712	IN	INTEGER				REFS	53	DEFINED	51	52
8	INFO2	REAL	ARRAY		RFINFO	REF	6	8	13	15 136 137
							6*145	6*148		
9	INFO1	REAL	ARRAY		RFINFO	REF	6	8	15	127 9*128
713	ISAVEA	INTEGER				REF	85	DEFINED	58	
14	ISEQNO	INTEGER			SHARE	REFS	9			
11	ITYPE	INTEGER			SHARE	REFS	9	32	48	52 57 77
							125			
	I2NO	INTEGER			NTABS	REFS	12	110	134	
1	I3NO	INTEGER			NTABS	REFS	12	115	126	
72.	J	INTEGER				REF	127	10*128	135	136 137 6*141
						6*148	DEFINED	126	134	
721	K	INTEGER				REF	141	145	148	DEFINED 135
714	L	INTEGER				REF	61	79	DEFINED	59
715	M	INTEGER				REF	2*79	2*89	DEFINED	78 88
1706	MACH	REAL	ARRAY			REFS	5	16	41	73 DEFINED 39
14	MAMAX	REAL			RANGE	REFS	10	16		
11	MAMIN	REAL			RANGE	REFS	10	16	39	
12	MODE	INTEGER			SHARE	REFS	9	48		
15	MTEST	INTEGER			SHARE	REFS	9	25		
716	N	INTEGER				REF	79	89	DEFINED	79 89
4	NAL	INTEGER			F.P.	REFS	4	36	59	DEFINED 1
1	NALP	REAL			RANGE	REFS	10	16		
3	NBE	INTEGER			F.P.	REFS	4	44	78	88 DEFINED 1
2	NBET	REAL			RANGE	REFS	10	16		
717	NCARY	INTEGER				REFS	96	DEFINED	31	84 97
	NPTS	INTEGER			F.P.	REF	4	27	40	58 71 95
						DEFINED	1	85	100	
1	NRAC	REAL			RANGE	REFS	10	16		
						REF	100	DEFINED	95	

AD-A106 152 COMPUTER SCIENCES CORP HUNTINGDON VALLEY PA F/G 1/3
A GENERALIZED ESCAPE SYSTEM SIMULATION COMPUTER PROGRAM: A USER--ETC(U)
AUG 81 L A D'AULERIO, K M BREAKEY N62269-78-C-0191
UNCLASSIFIED NADC-81224-60 NL

```
      SUBROUTINE PTOUT        74/74    OPT=1                        FTN 4.6+428        81/03/18. 11.19.26        PAC

VARIABLES      SN  TYPE            RELOCATION
                                                    102
  2300  OPT        INTEGER     ARRAY               REF        7        14        48   DEFINED      22
  2355  IAHPD      INTEGER     ARRAY               REF        7        14        48      115      119
                                               DEFINED       22
   705  TARGET     INTEGER                         REFS      14        82        91   DEFINED      30        98
     .  WORKA      REAL        ARRAY      F.P.     REFS       4        79        89   DEFINED       1

FILE NAMES        MODE
     OUTPUT       FMT                   WRITES       48       53        55        60       65       69        73
                                           79        89      105       108       115      119      120       122
                                          124       141      145       148

STATEMENT LABELS              DEF LINE    REFERENCES
     .  20                       42         43
     .  21                       46         44
     .  22                       81         78
     .  23                       38         36
     .  25                       86         59
   111  26                       65         57
   201  27                       88         77
     .  28                        9         88
     .  29          INACTIVE     82
     4  31                       34         32
   123  32                       69         68
   244  33                      105         68
   247  34                      118         68
   252  4                       114         25
   555  110    FMT              116        115        119
   257  111                     119        114
   261  112                     120        118
   574  115    FMT              121        120
   665  120    FMT              123        122        124
     .  121                     132        126
   334  123                     141        140
   351  124                     145        140
   366  125                     148        14
   632  130    FMT              131        128        145
   317  131                     134        125
   462  132                     151        136        144       147
   65.  134    FMT              143        141
   761  135    FMT              15         140
   43.  140    FMT               54         53
   44.  150    FMT               56         55
   414  160    FMT               49         48
   450  170    FMT               61         60
   476  171    FMT                7         60
   477  172    FMT               74         73
   516  173    FMT                8         79         89
   46.  174    FMT               66         65
   5.5  175    FMT               76         75
   127  176                      72         69
   111  177                      64        104
   533  180    FMT              106        105
   125  181                      71        107        110
```

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```
      SUBROUTINE PTOUT      74/74   OPT=1                    FTN 4.6+428      81/03/18. 11.19.26      PAG

 LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
    34  23           I        36 38         3B     INSTACK
    45  2.           J        4' 42         3B     INSTACK
    56  21           I        44 46         3B     INSTACK
   104  25       * L          59 86         2AH              EXT REFS   ENTRIES    EXITS   NOT INNER
   143  22       * M          78 81         26H              EXT REFS   NOT INNER
   152           * N          79 79         13H              EXT REFS
   202  28       * M          88 96         2EH              EXT REFS   NOT INNER
   211           * N          89 89         12H              EXT REFS
   272  121      * J         126 132        2CH              EXT REFS
    32  132      * J         134 151        65H              EXT REFS

 COMMON BLOCKS    LENGTH     MEMBERS - BIAS NAME(LENGTH)
        SHARE         15              0 FMT     (4)          8 NOFTAB (1)          9 ITYPE   (1)
                                     10 MODE    (1)         11 IC     (1)         12 ISEQNO (1)
                                     13 NTEST   (1)         14 IPLNK  (1)
        RANGE         14              0 IDENT   (1)          1 NALP   (1)          2 NRET    (1)
                                      3 NMAC    (1)          4 DELALP (1)          5 DELRET  (1)
                                      6 DLLMAC  (1)          7 ALMIN  (1)          8 BEMIN   (1)
                                      9 MAMIN   (1)         10 ALMAX  (1)         11 BEMAX   (1)
                                     12 MAMAX   (1)         13 NTYP   (1)
        NTAB           2              0 ISNO    (1)          1 ISNO   (1)
        INFO         300              0 INFO2   (300)

 EQUIV CLASSES    LENGTH     MEMBERS - BIAS NAME(LENGTH)
INFO2   INFO2        300              0 INFO3   (240)

 STATISTICS
    PROGRAM LENGTH                2337H     1247
    CM LABELED COMMON; LENGTH      513H      331
```

```
      1              SUBROUTINE READRF(IT,WORKA)
                   C  THIS ROUTINE READS THE TABLES FROM THE RANDOM FILE TO MEMORY
                      DIMENSION WORKA(70.)
                      DIMENSION IF2(30,10),IF3(20,13)
      5               EQUIVALENCE (IF2(1,1),IF3(1,1))
                      COMMON/SHAPE/FMT(8),NOFTAB,ITYPE,MODE,IC,ISEQNO,MTEST,IDLNK
                      COMMON/RANGE/IDENT,NAL,NBE,NMA,DELALP,DELBET,DELMAC,ALMIN,
                     1             BEMIN,MAMIN,ALMAX,BEMAX,MAMAX,NTYP
                      COMMON/DEFINE/IF2(30,10)
     10               REAL IF2,IF3
                      REAL NAL,NBE,NMA,MAMIN,MAMAX,IDENT
                      GO TO (1,2),ITYPE
                    1 IDENT=IF2(IT,1)
                      NBE=IF2(IT,2)
     15               NMA=IF2(IT,3)
                      DELBET=IF2(IT,4)
                      DELMAC=IF2(IT,5)
                      BEMIN=IF2(IT,6)
                      MAMIN=IF2(IT,7)
     20               BEMAX=IF2(IT,8)
                      MAMAX=IF2(IT,9)
                      NTYP=IF2(IT,10)
                      NMCF=NBE*NMA
                      MCF=NMCF+.50
     25               IRF=IT+2
                      CALL READMS(1,WORKA,MCF,IRF)
                      RETURN
                    2 IDENT=IF3(IT,1)
                      NAL=IF3(IT,2)
     30               NBE=IF3(IT,3)
                      NMA=IF3(IT,4)
                      DELALP=IF3(IT,5)
                      DELBET=IF3(IT,6)
                      DELMAC=IF3(IT,7)
     35               ALMIN=IF3(IT,8)
                      BEMIN=IF3(IT,9)
                      MAMIN=IF3(IT,10)
                      ALMAX=IF3(IT,11)
                      BEMAX=IF3(IT,12)
     40               MAMAX=IF3(IT,13)
                      NMCF=NAL*NBE*NMA
                      MCF=NMCF+.50
                      CALL READMS(1,WORKA,MCF,IT)
                      RETURN
     45               END
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
4	1	IF2	PREVIOUSLY DIMENSIONED ARRAY. FIRST DIMENSIONS WILL BE RETAINED.
12	1		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS DEF LINE REFERENCES
3 READPF 1 27 44

VARIABLES SN TYPE PFLOCATION
12 ALMAX REAL RANGE REFS 7 DEFINED 18
7 ALMIN REAL RANGE REFS 7 DEFINED 35
13 BEMAX REAL RANGE REFS 7 DEFINED 20 39
8 BEMIN REAL RANGE REFS 7 DEFINED 18 36
4 DELALP REAL RANGE REFS 7 DEFINED 32
5 DELBET REAL RANGE REFS 7 DEFINED 16 33
6 DELMAC REAL RANGE REFS 7 DEFINED 17 34
. EHT REAL ARRAY SHARE REFS 6
16 IMLNK INTEGER SHARE REFS 6
13 IC INTEGER SHARE REFS 6
. IDENT REAL RANGE REFS 7 11 DEFINED 13 28
. IF2 REAL ARRAY PFINFO REFS 4 5 9 10 13 14
16 17 18 19 20 21 22
. IF3 REAL ARRAY PFINFO REFS 4 5 15 28 29 30
32 33 34 35 36 37 38
40
114 IRF INTEGER REFS 26 DEFINED 25
14 ISEQNO INTEGER SHARE REFS 6
. IT INTEGER F.P. REFS 13 14 15 16 17 18
20 21 22 25 28 29 30
32 33 34 35 36 37 38
40 43 DEFINED 1
11 ITYPE INTEGER SHARE REFS 6 12
14 MAMAX REAL RANGE REFS 7 11 DEFINED 21 40
11 MAMIN REAL RANGE REFS 7 11 DEFINED 19 37
113 MCF INTEGER REFS 26 43 DEFINED 24 42
12 MODE INTEGER SHARE REFS 6
15 MTEST INTEGER SHARE REFS 6
1 NAL REAL RANGE REFS 7 11 41 DEFINED 29
2 NME REAL RANGE REFS 7 11 23 41 DEFINED 14
3 NMA REAL RANGE REFS 7 11 23 41 DEFINED 15
10 NOFT/B INTEGER SHARE REFS 6
15 NTYP INTEGER RANGE REFS 7 DEFINED 22
112 RMCF REAL REFS 24 42 DEFINED 23 41
. WORKA REAL ARRAY F.P. REFS 3 26 43 DEFINED 1

EXTERNALS TYPE ARGS REFERENCES
READHS 4 26 43

STATEMENT LABELS DEF LINE REFERENCES
14 1 13 12
43 2 28 12

COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)
SHARE 15 0 EHT (6)
10 MODE (1)
13 NTYP (1)
6 IDENT (1)
3 MA1 (1)
RANGE 14
8 NOFTAB (1)
11 IC (1)
14 IMLNK (1)
1 NAL (1)
4 DELALP (1)
9 ITYPE (1)
12 ISEQNO (1)
2 NME (1)
5 DELBET (1)

COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME (LENGTH)		
		9 MAMIN (1)	10 ALMAX (1)	11 BEMAX (1)
		12 MAMAX (1)	13 NTYP (1)	
NFINFO	300	0 IF2 (300)		

EQUIV CLASSES	LENGTH	MEMBERS - BIAS NAME (LENGTH)
IF2 IF2	300	0 IF3 (260)

STATISTICS

PROGRAM LENGTH	115H	77
CM LABELED COMMON LENGTH	511H	329

```
      SUBROUTINE WRTINFO(KTST)
C  WRTINFO PERFOR S VARIOUS OPERATIONS ON THE INFO ARRAY
C  IT MAY BE USED TO WRITE IT ON DISK, READ THE INFO ARRAY FROM
C   DISK INTO MEMORY, OR CHECK THE CONTENTS OF A CERTAIN
C   TABLE NUMBER
      DIMENSION INFO2(30,10),INFO3(20,13)
      EQUIVALENCE (INFO2(1,1),INFO3(1,1))
      COMMON/SHAPE/FMT(8),NOF2(8),ITYPE,NODE,IC,ISECNO,NTEST,IBLNK
      COMMON/ERINFO/INFO2(30,10)
      COMMON/RANGE/IDENT,NAL,NNE,NMA,DELALP,DELBET,DELMAC,ALMIN,
     )             BEMIN,MAMIN,ALMAX,BEMAX,MAMAX,NTYP
      COMMON/NTABS/I200,I300,ITABNO
      COMMON/ERCOM/NCUEF,ILPTEST,IJ,IK
      REAL  INFO2,INFO3
      REAL NAL,NNE,NMA,MAMIN,MAMAX,IDENT
C  KTST DETERMINES THE PROCEDURE TO BE USED TO READ
C   OR WRITE THE INFO ARRAY
      GO TO (3,22,33),KTST
C  KTST = 1
C   AFTER ALL TABLES HAVE BEEN READ,WRITE THE INFO ARRAY
C     TO THE PROPER RANDOM FILE
      GO TO (31,32),ITYPE
   31 NUMW=300
      CALL WRITMS(1,INFO2(1,1),NUMW,52)
      RETURN
   32 NUMW=260
      CALL WRITMS(1,INFO3(1,1),NUMW,51)
      RETURN
C  KTST = 2
C   PROCEDURE FOR CHANGING INFO ARRAY ON AN EXTENSION RUN
C   AND FOR DETERMINING THE NUMBER OF TABLES ON A LIST RUN
   22 GO TO (23,24),ITYPE
C  READ THE INFO ARRAY FROM THE RANDOM FILE
   23 CALL READMS(1,INFO2(1,1),300,52)
C  FIND THE LAST TABLE NUMBER BY COMPARING
C   THE IDENT FIELD TO IBLNK(=0000000000)
      DO 25 IJ=1,30
      IF(INFO2(IJ,1).EQ.IBLNK)GO TO 26
   25 CONTINUE
      IF(MODE.NE.2)GO TO 50
      CALL ERMSG(5)
      IF(IERTEST.EQ.1)RETURN
   26 IC=IJ
      IF(MODE.NE.2)GO TO 50
C  TEST TO SEE WHETHER THE TABLES CAN BE EXTENDED
C   BY NOFTABS WITHOUT EXCEEDING THE LIMIT
      LNTH2=IJ+NOFTAB
      IF(LNTH2.GT.30)CALL ERMSG(6)
      NTC=T=1
      RETURN
C  SAME PROCEDURE AS ABOVE IS FOLLOWED FOR 3-WAY TABLES
   24 CALL READMS(1,INFO3(1,1),260,51)
      DO 27 IK=1,20
      IF(INFO3(IK,1).EQ.IBLNK)GO TO 28
   27 CONTINUE
```

```
                IF(IERTEST.EQ.1)RETURN
             28 IC=IC
      60        IF(MODE.NE.2)GO TO 51
                LNTH=IK*NOFTAB
                IF(LNTH.GT.25)CALL ERMSG(8)
                NTEST=1
                RETURN
      65    C  PROCEDURE FOR DETERMINING THE NUMBER OF TABLES
            C   WHEN RUNNING UNDER LIST OPTION
            50  IF(IJ.LT.3 )IJ=IJ+1
            C  SET IJMO AS THE NUMBER OF 2-WAY TABLES ON RANDOM FILES
                IJMO=IJ-1
      70        RETURN
            51  IF(IK.EQ.2 )IK=IK+1
            C  SET IKMO AS THE NUMBER OF 3-WAY TABLES ON RANDOM FILES
                IKMO=IK-1
                RETURN
      75    C  KTEST = 1
            C   PROCEDURE FOR CHANGING INFO ARRAY ON A REPLACE RUN
            C  READ INFO ARRAY FROM RANDOM FILE AND TEST TO BE SURE THAT
            C   THE GIVEN SEQUENCE NUMBER IS A VALID TABLE
            33  IF(KTEST.EQ.1)GO TO (43,44),ITYPE
      80        GO TO (41,42),ITYPE
            41  CALL READM(1,INFO2(1,1),300,521)
            43  ITABNO=ISEQNO-20
                IF(INFO2(ITABNO+1).EQ.IBLNK)CALL ERMSG(3)
                NTEST=1
      85        RETURN
            42  CALL READMS(1,INFO3(1,1),260,51)
            44  ITABNO=ISEQNO
                IF(INFO3(ITABNO+1).EQ.IBLNK)CALL ERMSG(3)
                NTEST=1
      90        RETURN
                END
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
9	I	INFO2	PREVIOUSLY DIMENSIONED ARRAY, FIRST DIMENSIONS WILL BE RETAINED.
18	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
22	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
32	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
37	I		CONTROL VARIABLE IN COMMON OR EQUIVALENCED, OPTIMIZATION MAY BE INHIBITED.
53	I		CONTROL VARIABLE IN COMMON OR EQUIVALENCED, OPTIMIZATION MAY BE INHIBITED.
79	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.
80	I		AN IF STATEMENT MAY BE MORE EFFICIENT THAN A 2 OR 3 BRANCH COMPUTED GO TO STATEMENT.

SYMBOLIC REFERENCE M/P (R=1)

ENTRY POINTS	DEF LINE	REFERENCES							
3 WRINFO	1	25	28	42	50	58	64	70	74	85

VARIABLES	SN	TYPE		LOCATION							
12 ALMAX		REAL		RANGE	REF	10					
7 ALMIN		REAL		RANGE	REF	10					
13 BEMAX		REAL		RANGE	REF	10					
14 BEMIN		REAL		RANGE	REFS	10					
4 DELALP		REAL		RANGE	REFS	10					
5 DELBET		REAL		RANGE	REFS	10					
6 DELMAG		REAL		RANGE	REFS	10					
. FHI		REAL	ARRAY	SHARE	REFS	8					
16 IHLINK		INTEGER		SHARE	REFS	8	38	54	83	88	
13 IC		INTEGER		SHARE	REFS	8	DEFINED	43	59		
. IDENT		REAL		RANGE	REFS	10	15				
1 IERTEST		INTEGER		ERCOM	REFS	13	42	58			
2 IJ		INTEGER		ERCOM	REFS	13	38	43	47	2*67	69
					DEFINED	37	67				
3 IK		INTEGER		ERCOM	REF	13	54	59	61	2*71	73
					DEFINED	53	71				
. INFO2		REAL	ARRAY	RFINFO	REFS	6	7	9	14	24	34
						81	83				
. INFO3		REAL	ARRAY	RFINFO	REFS	6	7	14	27	52	54
						88					
14 ISEQNO		INTEGER		SHARE	REFS	8	82	87			
2 ITABNO		INTEGER		NTABS	REFS	12	83	88	DEFINED	82	87
11 ITYPE		INTEGER		SHARE	REFS	8	32	32	79	80	
. I2NO		INTEGER		NTABS	REFS	12	DEFINED	69			
1 I3NO		INTEGER		NTABS	REFS	12	DEFINED	73			
. NTST		INTEGER		F.P.	REFS	18	DEFINED	1			
251 LNTH2		INTEGER			REFS	48	DEFINED	47			
252 LNTH3		INTEGER			REFS	62	DEFINED	61			
10 MAMAX		REAL		RANGE	REFS	10	15				
11 MAMIN		REAL		RANGE	REFS	10	15				
12 MODE		INTEGER		SHARE	REFS	8	43	44	56	60	
15 NTEST		INTEGER		SHARE	REFS	8	79	DEFINED	49	63	84
1 NAL		REAL		RANGE	REFS	10	15				
2 NBE		REAL		RANGE	REFS	10	15				
. NCOEF		INTEGER		ERCOM	REFS	13					
3 NMA		REAL		RANGE	REFS	10	15				
9 NOFTAB		INTEGER		SHARE	REFS	8	47	61			
15 NTYP		INTEGER		RANGE	REFS	10					
250 NUMB		INTEGER			REFS	24	27	DEFINED	23	26	

EXTERNALS	TYPE	ARGS	REFERENCES					
ERMSG		1	41	48	57	62	83	88
HEADIS		4	34	52	81	86		
WRITHS		4	24	27				

STATEMENT LABELS		DEFINITION	REFERENCES
34	22	32	14
43	23	34	32
72	24	52	32
	25	34	17
81	26	43	18
	27		

STATEMENT LABELS		DEF LINE	REFERENCES	
15	3	22	14	
24	31	23	22	
3	32	25	22	
135	33	79	18	
154	41	81	4.	
166	42	86	8	
156	43	82	79	
17	44	87	79	
121	5	67	4	44
127	51	71	56	61

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
46	25	* IJ	37 39	58	INSTACK	EXITS
75	27	* IK	53 55	58	INSTACK	EXITS

COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME (LENGTH)					
SHARE	15	7 FPT (4)	9 HOFTAB (1)	9 ITYPE (1)			
		10 NODE (1)	11 IC (1)	12 ISEQNO (1)			
		13 NTEST (1)	14 IPLNK (1)				
RFINFO	300	0 INFO2 (300)					
RANGE	14	0 IDENT (1)	1 NAL (1)	2 NNE (1)			
		3 NNA (1)	4 DELALP (1)	5 DELBET (1)			
		6 DELNAC (1)	7 ALMIN (1)	8 BEMIN (1)			
		9 NAMIN (1)	10 ALMAX (1)	11 BEMAX (1)			
		12 NAMAX (1)	13 NTYP (1)				
RTAR	3	0 IZNO (1)	1 IZNO (1)	2 ITABNO (1)			
EPCON	4	0 NCOLF (1)	1 IERTEST (1)	2 IJ (1)			
		3 IK (1)					

EQUIV CLASSES	LENGTH	MEMBERS - BIAS NAME (LENGTH)
INFO2 INFO2	300	0 INFO3 (260)

STATISTICS

PROGRAM LENGTH	253B	171
CM LABELED COMMON LENGTH	520B	336


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